

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

NEW YORK, MAY 12, 1920

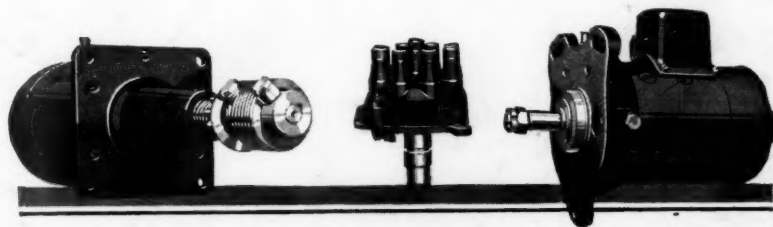
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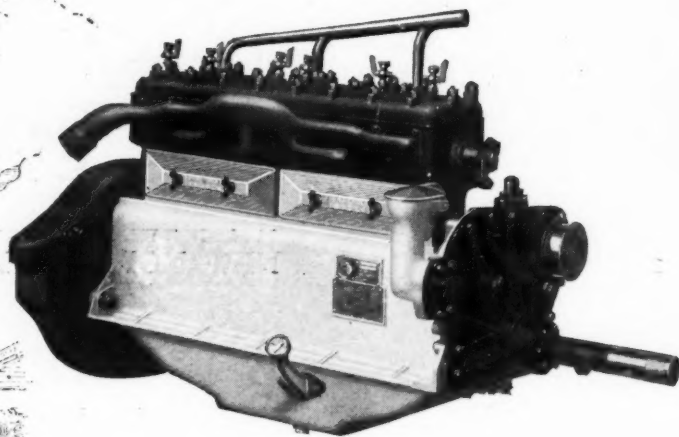
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# Continental Motors

STANDARD POWER FOR TRUCKS, AUTOMOBILES AND TRACTORS

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

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No. 10

## The Need for an Understanding of Labor and Industry

This article is a warning and a call for action to every man in industry to-day. Mr. Tipper shows the laxity of thought and the failure to study and advance that have left unsolved our economic, political and labor problems, a danger to present and future.

By Harry Tipper

**D**URING a conversation with a big industrial leader the other day, he remarked that, if a well informed industrial observer of Washington's time had been able to talk to an equally well informed observer of the time of the Ptolemies in Egypt, they would have revealed industrial methods sufficiently similar to bring their conceptions close together. On the other hand, if an industrial observer of Lincoln's time were to attempt to talk with a competent industrial observer of to-day, the difference in viewpoint would be so vital as practically to make conversation impossible. This statement struck me at the time as such a simple method of expressing the enormous changes pressed into sixty years of mechanical development that it indicates clearly some of the difficulties which must arise out of the rapid changes. It is another way of saying that, in a period of not more than a century, the industrial development has overturned not only the whole conception of industry, but the whole social and political existence have been revolutionized to the same extent.

In comparison with surroundings, however, human nature changes so slowly in its mental development that it seems to be static. Without understanding the significance of the phrase, we express it by the statement that human nature is always the same.

All the deep rooted traditions, the political sentiments and the habits of organization in social and

political life, refer back to the time before this development occurred and, as yet, we conduct our political organization, our jurisprudence and our social organizations almost entirely by the conception of rights and obligations which arose during those centuries. It is the attempt to adjust these slowly developing human organizations to the rapidly developing changes in the complexity of the mechanical equipment and surroundings of life that brings about the present plethora of theories, governmental experiments and mass actions with which we are struggling.

The ease with which we have been able to develop the mechanical equipment of life, so that we have arrived at a degree of comfort, far in advance of anything previously contemplated by the wildest of imaginations, has led us to forget that the very rapidity of these changes demands a study of the human side and a knowledge of human progress equally far in advance of that which was previously possessed. The fact is, however, that we have been immersed in the job of improving the mechanical equipment and in increasing the comfort and convenience of life to such a degree that we have almost neglected the study of the human side.

It is not without significance that our conceptions of philosophy, our ideas of logic, our traditions of



human organization remain almost unchanged since the industrial development began, and in not one of these fields has there been recorded any notable advance. In the meantime, the extremely rapid growth of interdependence which has come with the development of the mechanical arts and the specialization of occupation, calls for a degree of knowledge in human affairs and a degree of organization in the conduct of human affairs far beyond anything the world has seen heretofore. This very interdependence is capable of producing disaster just as great as its present advance in comfort and convenience of life. The great war was an illustration of the ease with which a small matter can be turned into a world-wide disaster by the very interdependent character of modern operations.

So long as we are content to accept the traditions of organization which belong to a different social existence, so long as we are content to adhere to methods of the industrial organization which belong to the same period, the whole of industry is in danger from the incapacity to understand and guard against the possibilities of disaster. The very fact that we are incapable of settling the agreements for production with a hundred or a few thousand men until they have interrupted the work of production or seriously threatened such an interruption, indicates our lack of capacity to understand the weakness of our own organization.

We seem to be equally incapable of interpreting the new economic and political theories of the workman's organizations and the newer political organizations. We showed considerable capacity in the protection of our system of comfort and convenience when it was threatened by the great war, *but we have shown little of that capacity in attempting to settle the terms of agreement when the actual conflict was over.* While industry needs larger facilities for transportation and more rapid communications, politics waits upon compromise for the individual and party agreements until the railroad system has become entirely inadequate for our industrial requirements and the transportation systems of our great cities are so far behind the necessities that they are crowded almost to the limits of human capacity for endurance.

As a matter of fact, the industrial observer of Lincoln's time and the industrial observer of to-day, of whom we spoke, would be no further apart than the industrial leader of to-day and his own workers. In so many cases that they constitute a considerable majority, the worker and the owner of the establishment find it impossible to converse in any language giving them a common ground of understanding.

Specialization of occupation and the great difference in the social surroundings, education and general tendencies have put the different classes of labor and management so far apart that it is almost impossible for them to get together without a deliberate and studious effort to arrive at the basis of understanding. As acute business men have observed more than once, it is up to the manager and the owner to understand his labor; it is not to be expected that labor will attempt to understand the manager or owner. Philosophic observers of history have indicated in their estimate of political requirements that it is up to the governors to understand the governed. That is the same thing. This means that it is up to the industrial manager or owner who would

arrive at a place where he can agree with his workers or get them to agree with him, to study a different language and a different set of ideals and a different conception of modern conditions than the ones in which he has been accustomed to think and act. He must be prepared to rid himself of his preconceived ideas on the matter and to develop from careful observation and study a knowledge of those significant usages in expression, in ideals, etc., which make words mean something entirely different to two men, although they may be expressed in the same tongue.

The complex machine of industry manages to move along despite stoppages and interruptions, and the fact that it is tied up with string in places where it should be linked with steel, but in respect of what is necessary for our continual advancement it is like the automobile of the earlier days. It is a wonderful instrument, the subject of pride to its observers, far in advance of anything previously conceived, but likely to stop by breakdown of one of its parts at a most inconvenient time under the most aggravating circumstances.

The only difference is that our present industrial organization is not weak particularly in its mechanical arrangement, but is weak because of our ignorance of human organization and the fundamental requirements of that organization under the rapid developments of the last few decades.

It is not long ago that a hard headed, shrewd, practical business man who has made a study of industrial history advanced the opinion that he was unable as yet to determine whether this mechanical civilization could continue indefinitely without a break. It has lasted long enough and developed far enough so that it cannot be dispensed with. The interdependence is here and, unless the machine operates within a reasonable percentage of capacity, a certain portion of the population of any industrial country must die. It has lasted long enough to justify our pride in its creation but, because of the slow development of human organization, it has not lasted long enough to justify the present methods of organization, and it is even now showing significant signs of weakness.

It is not enough that we should believe that the American Federation of Labor is incapable of solving the labor problem. It is not enough that we should feel that the socialist theory is unworkable. It is not enough to erect industrial relations departments and representative plans and even to prove our fairness to our individual employees. It is necessary that we should become interested in the national questions, in the political tendencies and in the social difficulties and in the methods in which they are being met.

The manager of a stone quarry said at a meeting the other day, "when I had approached my board of directors for \$36,000 for a new stone crusher, I got it without argument. When I asked for \$5,000 to better living conditions at the quarry I was refused. I could get along without the stone crusher but I must have the improved living conditions if I am to continue to have sufficient and careful labor."

Do not forget that the man working as a machinist in your employ is casting his vote as a citizen and is translating his belief or conception into his political expression. Do not forget that the children of this man are being educated in this era of interdependence by people who know little or nothing about modern industrial organizations, in subjects which are not applied to



anything in his life and with methods which perpetuate old traditions from a former social organization. It is well to remember that most of the voters of this country do not realize that their food for next month depends on a hundred thousand people working during this month and a half million more producing behind them. Most of them do not realize that the milk and refrigerator trains cannot reach their industrial city if there are not enough engineers, or if the engine needs replacement, or if there are not enough cars, plenty of tracks and terminal facilities and a constant incentive to keep work going on all down the line from the farmer to the driver of the wagon.

Socially, politically and industrially our present organization has changed too little to bring the intelligence of the people up in proportion to the necessities for intelligence in order to keep the machine going. We are only beginning to sense the difficulty now that the mass movements of labor and socialism have attained sufficient strength to become expressive and influential. We are only beginning to sense the fact that experiments of great importance are pending in respect to which we have no previous information and in respect to which our study has been practically nothing.

Industry can develop only in proportion to the development of the social and political organization.

It can be halted by the actions of the voters and by the crude machinery of social government just as easily as it can be halted by its own internal difficulties. In fact, no decision can be made between internal and external difficulties. Every plan of general education, every question of political organization, every law of an economic character proposed by the Government, affects every industry and should be equally interesting to every industrial leader.

Year by year new experiments will be made and new organizations and suggestions introduced. Unless the industrial leaders begin to study human affairs and the political and social development, interesting themselves in every move of this kind, they will wake to find that they have been bound in red tape created by men who are powerful in politics or social life but without knowledge of industry and with little knowledge of the principles of human development.

There is no immediate danger in this country of revolutionary changes, but there is a great danger of continual experiment, entered upon in ignorance and conducted without efficiency, creating the very atmosphere out of which revolutionary proposals obtain their power.

## Foreman Co-operation Essential to Efficient Production

ADDRESSING the men who have charge of employment, safety work and other branches of industrial relations at the principal plants within the Chicago industrial district, John Calder, manager of employees' relations, Swift & Co., said in part:

"In some plants I visit I know cases where workmen have a big grudge against their employers simply on account of the 'bullying' of some foremen or assistant foremen. Some executives and department heads are sore and not able to concentrate fully on their tasks because they are abused verbally and in other ways by men still higher. Government by fear and espionage is both despicable and futile. This is inexcusable folly. It kills all team-work and it lies at the bottom of a surprising amount of executive soreness and of labor unrest which manifests itself usually in extravagant demands often far removed from the actual causes. An employer is often misrepresented to his workers by his own foremen. You must also remember in your team-work that the bridge of words between you and your workers is frequently very weak and that ideas often fail completely to get over. Much of our poor work is due to the fact that the workman does not understand his orders.

"One factory I know of kept in its employment a very stupid man and the explanation the manager gave was that when he had a bulletin or instruction of general interest to issue he always tried it out on this man and when he was sure the stupid man understood it, he knew it was perfect.

"We must organize to restore personality in big business and we can only do it through the foremen. I saw a dog smell the third rail once. He was full of information in a moment, but he was a dead dog. He died of intensive education. Such a fate will not befall any foremen, I am sure. If an associated, enlightened group of foremen anywhere will tackle production problems and production people in the proper way I venture to say that industrial troubles will not prove insoluble and industrial good-will

will be restored. Healthy discontent is the normal American outlook, while all of our efforts should be toward eliminating the unhealthy kind based on untruth, ignorance, suspicion and abuse.

"Nobody was ever yet educated by merely 'pumping in' facts and opinions; unless there is a measure of 'drawing out' there is no education. To-day the whole world is intensely interested in modern production methods. Everywhere, even in prolific America, goods are scarce and are getting scarcer, and there is much cry about 'higher wages' but little or none about 'more work,' and it is only more work that will produce more things.

"You may remember that when Hinnissey asked Mr. Dooley, 'Is worruk a nicissiry evil?' the wise philosopher of Archy Road said, 'If it's nicissiry, it's not an evil, and if it's an evil, it's not nicissiry,' and David Harum reminded us that 'Fleas is good for a dog; they keeps him from thinking about being a dog.' What we call the 'Economic Urge' is a wise dispensation of Providence that keeps us always on the jump when things are not running as they should be."

THE Chamber of Commerce of the United States has announced the appointment of Chauncey D. Snow, former commercial attaché at Paris, as head of its new Department of Foreign Trade. The new department is one of several that are being organized, as a means of dividing the work of the Chamber along lines of the great divisions of industry. The other departments to be created include industrial production, domestic distribution, transportation and communication, finance, insurance and civic development.

ACCORDING to reports at the Commerce Department, copper imports into the United States in 1919 fell off by more than 30,000,000 lb., compared with 1918. During last year 126,455,063 lb. of copper ore, valued at \$23,541,020, were imported, against 157,216,481 lb., valued at \$34,650,864, in 1918.

# Packard Adapts Three Truck Models to Pneumatic Tires

An engine formerly used on a 5-ton design is placed in the new model Y, rated customarily at 3-ton capacity, in the change from solid tires, although no deviation from the former frame construction was considered necessary. This description shows how the Packard engineers have met the problem of the higher speeds attained in the new models so equipped.

By J. Edward Schipper

COMING at a time when the large pneumatic tired truck is one of the most important developments in the industry, the new Packard model Y is of unusual interest. Ordinarily, it would be rated as a 3-ton truck but, in accordance with the policy recently adopted by Packard of discontinuing capacity ratings, it is introduced under the symbol letter Y. It is designed for a maximum weight of 8000 lb. above the chassis, including the body and load, so that, in order to carry its normal capacity load, the body should weigh not more than 2000 lb.

However, it is now the policy of the Packard company to make first a study of the use to which the truck is to be put and then to furnish a truck suitable for that particular task. A light truck is able to carry a given load over fine, smooth roads, whereas, if the runs are through territory where the going may be rough and unfavorable conditions are encountered, a greater factor of safety is sought in the chassis and running gear and, consequently, a truck may be furnished that would ordinarily carry a greater capacity. Following this policy, the Packard company stamps on the name plate the data regarding the work the truck is to do and then, in case the truck is sold and passes into other hands, it must meet the approval of the Packard transportation engineer before the company will stand back of the machine and its performance.

To all intents and purposes, the new model is a 3-ton

pneumatic truck and is comparable with other types of that capacity. An entirely new chassis and running gear has not been designed to take care of the pneumatic requirements. The problem has been analyzed as of a two-fold character, namely, the dead weight carrying unit and the propulsive unit. In shifting from solids to pneumatics, it is the belief of the Packard engineers that nothing has been done to influence the weight carrying factors and hence they remain the same. In other words, the frame design of the 3-ton pneumatic job is the same as that of the 3-ton solid. On the other hand, the propulsive units have been altered as regards the powerplant in order to take care of the higher speeds at which the pneumatic vehicle will travel and to provide the same ability at the rear wheels with the larger diameters due to pneumatics.

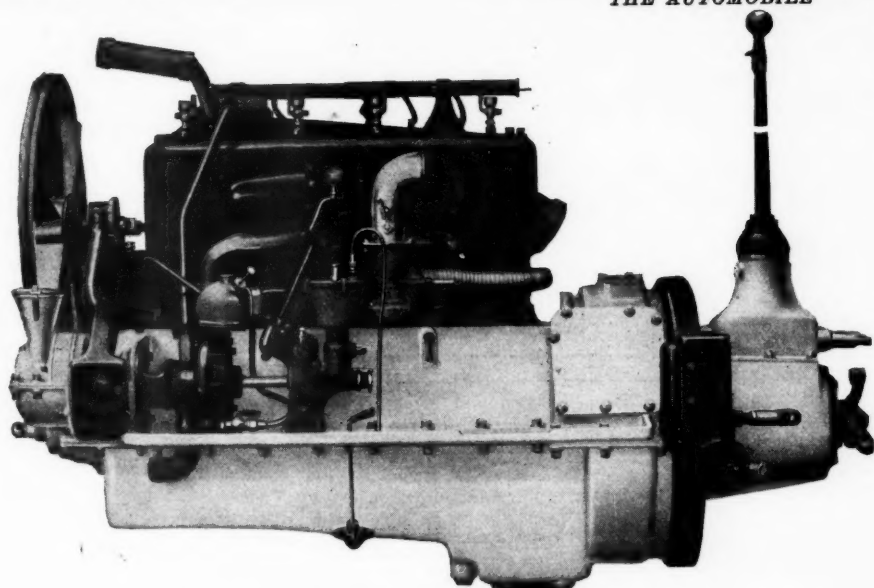
To meet this problem, the same engine as is utilized in the 5-ton solid-tired truck has been placed in the 3-ton pneumatic and the governor speed has been increased from 1100 to 1600 r.p.m., giving a maximum truck speed of 24 m.p.h. The changes in the engine to adapt it for use on a 3-ton pneumatic-tired truck have been solely in the governor. Contrary to what would generally be expected, the gear ratios in the box have not been altered and the worm drive remains 9 to 1. The pneumatic tires carried by these trucks are 44 x 10 in. rear and 38 x 7 in. front.

The 5 x 5½-in. engine is a block cast four, with an S.A.E. rating of 40 hp. It is a solid head type with an aluminum crankcase, having a four-bearing crankshaft, and is a heavy duty product throughout. The iron pistons are 5⅜ in. in length and are heavily ribbed. The piston



Packard Y or 3-ton pneumatic truck with test load



*Left side of Packard truck engine*

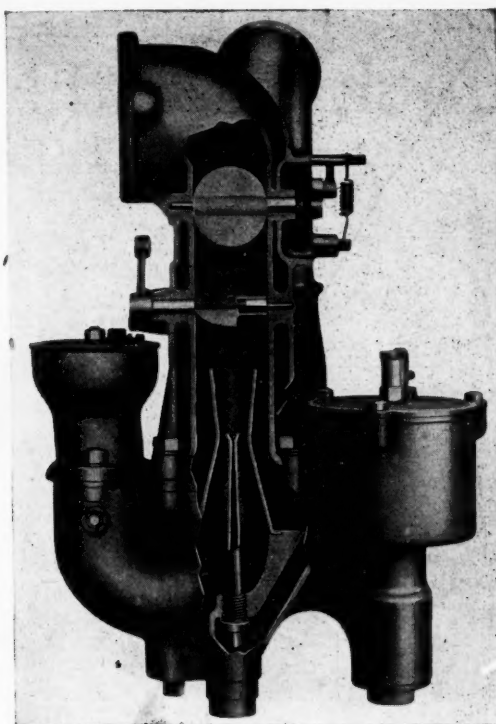
pin is clamped in the piston bosses and the bearing is formed in the upper end of the rod. There are three piston rings, all at the top of the piston, these being  $\frac{1}{4}$ -in. rings,  $\frac{3}{16}$  in. thick. The pistons are fitted to the cylinders by selection to give a clearance of 0.003 in. on the bottom of the skirt and 0.005 in. below the lower ring grooves. The piston pin is also a selective fit with the connecting rod bushing and so assembled as to obtain 0.00025 to 0.0005 in. clearance. The pin has  $\frac{1}{4}$  in. outside diameter and is  $4\frac{5}{8}$  in. in length.

The connecting rod is  $11\frac{3}{4}$  in. long. It is of I-beam section and so designed that the center line of the shank is  $\frac{3}{16}$  in. away from the center of the cylinder. This arrangement permits of larger size main bearings and increased water space between the cylinders. The crankpin bearing is  $2\frac{1}{4}$  in. in diameter and  $2\frac{1}{2}$  in. in length. These bearings are bronze backed, babbitt lined. End clearance of the crankpin bearings is held down to 0.003 in. in manufacture, and is not allowed to exceed 0.005 in. after test. The connecting rod and bushing assembly is a selective fit with the crankshaft, with a clearance of from 0.001 to 0.002 in. The weight of the piston complete and the upper end of the connecting rod is kept within a limit of variation of  $\frac{1}{2}$  oz. for the complete set.

The crankshaft is not counter-weighted but is exceedingly stiff, being  $2\frac{1}{4}$  in. in diameter and having a total projected bearing area of 29 sq. in. The bearings are all  $2\frac{1}{4}$  in. in diameter, the front bearing being 3 in. long, the two center bearings  $3\frac{1}{16}$  in. each, and the rear bearing  $3\frac{3}{4}$  in. The total projected area of the connecting rod bearings on the crankshaft is 22.5 sq. in. All of the crankshaft main bearings are die-cast, of the bronze-backed type. End play on the crankshaft is taken care of by flanges on the center main bearings; it is held to 0.001 in. in manufacture, and to 0.004 in. after test.

The camshaft is a helical-gear driven, integral forging mounted on four-bearings. The front bearing and the two center bearings have a diameter of  $2\frac{7}{16}$  in., the rear bearing being  $1\frac{1}{2}$  in. The lengths of the camshaft bearings are  $2\frac{15}{16}$  in. for the front,  $1\frac{1}{2}$  in. for each of the two intermediate bearings, and  $1\frac{3}{8}$  in. for the rear. This gives a total projected area of 16.55 sq. in. for the camshaft.

The valves are actuated by roller followers. The tappets are hollow and carry adjusting screws with check nuts for adjusting the valve stem clearance. Tappet guides are set into holes in a flange on the cylinder block

*The carbureter used on Packard truck engine*

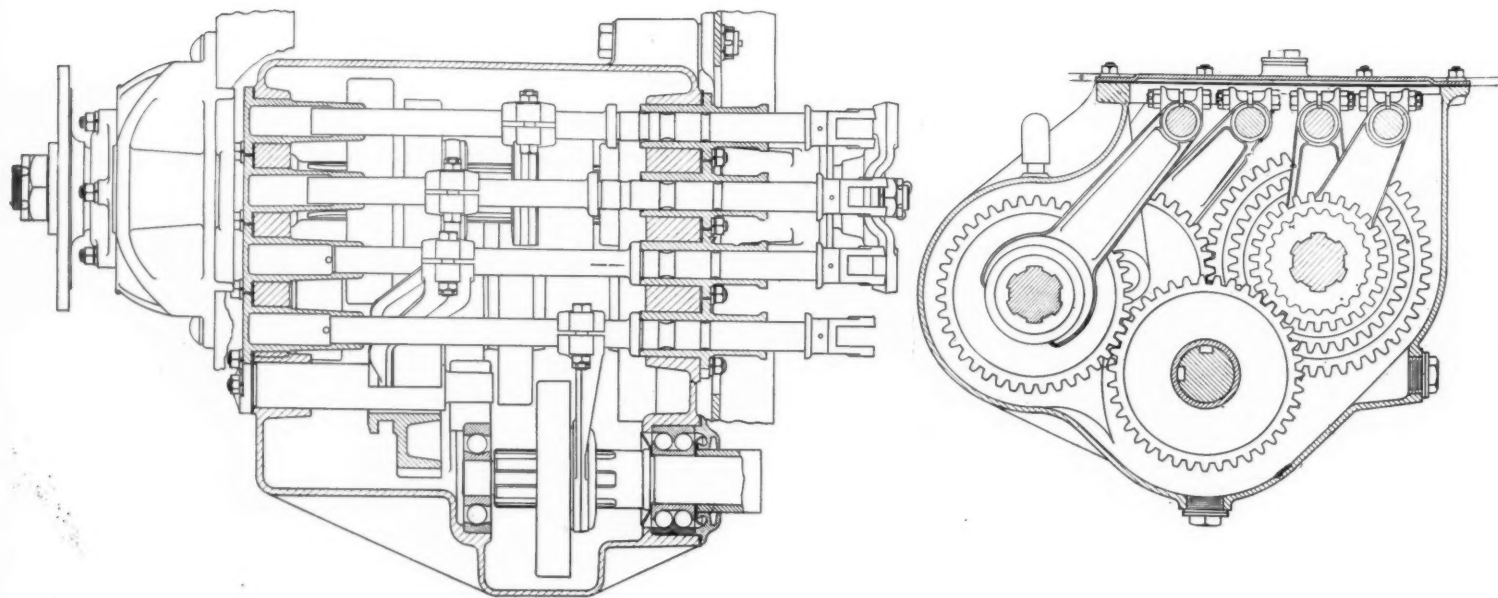
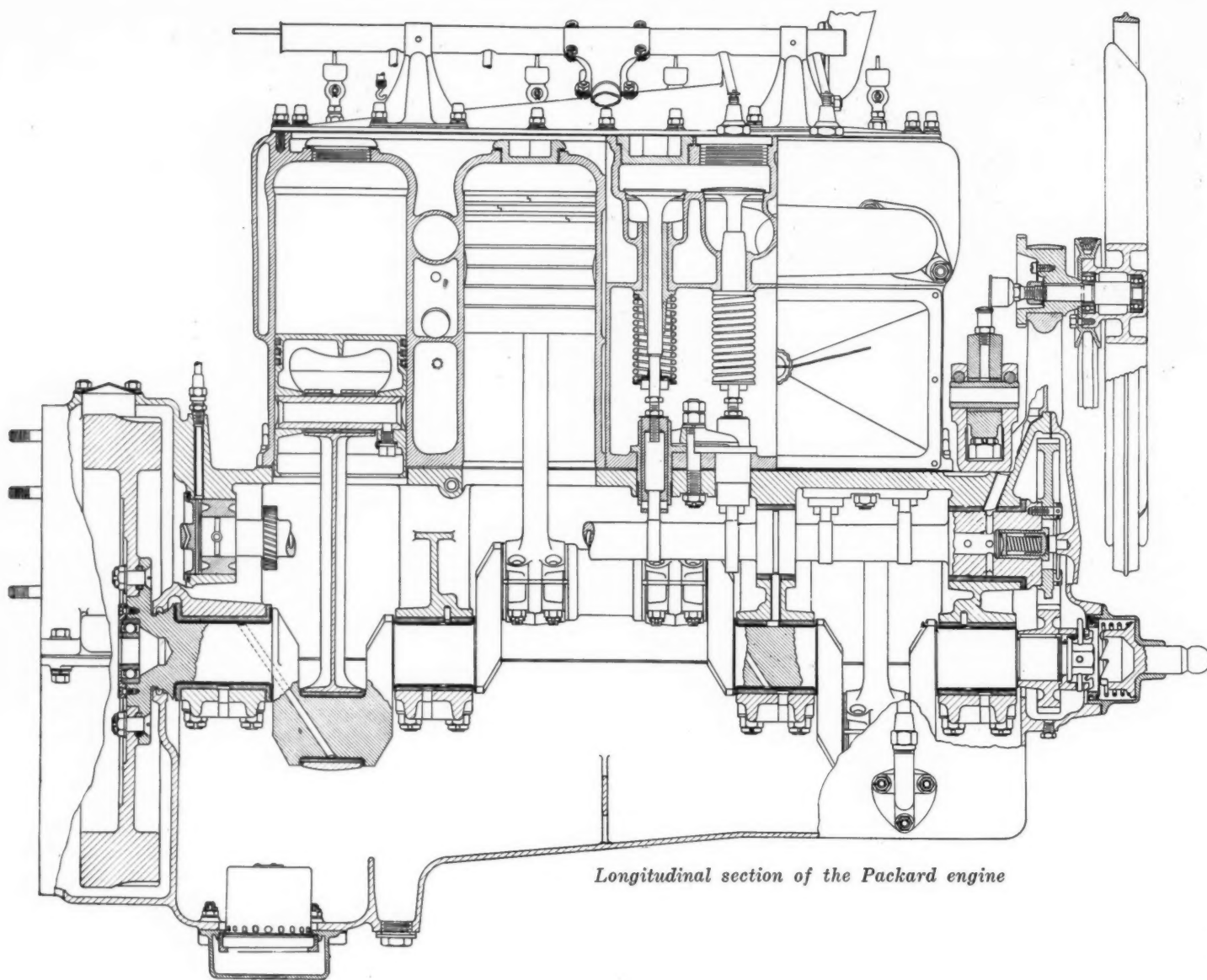
and in the crankcase and are held down by crowfoot clamps. The inside diameter of the guide is 1 in. and the length  $2\frac{1}{2}$  in. The valves have a clear diameter of  $2\frac{1}{2}$  in. and a  $\frac{5}{8}$ -in. stem, which is reduced to  $\frac{3}{8}$  in. in diameter at the lower end. The valve stem guides are cast iron of  $4\frac{1}{4}$  in. in length. The clearance between the inlet valve stem and guide is from 0.002 in. to 0.0045 in. and the clearance between the exhaust valve stem and its guide is 0.0085 to 0.011 in. The inlet and exhaust valve tappet clearances are 0.016 in. when the engine is warm. That is, at a temperature of 170 to 180 deg. Fahr.

Oiling is by pressure to the crankshaft, camshaft and timing gears and by spray to the pistons and upper rod bearings. The oil is circulated by a horizontal plunger pump driven by an eccentric off the camshaft. The pump is set horizontally on the right side of the engine and is removable for inspection by taking out the retaining cap screws. The oil reservoir has a capacity of  $3\frac{1}{4}$  gal.

The cooling water is circulated by a centrifugal pump driven off the governor shaft, and the circulating line incorporates a Sylphon thermostat mounted in the water header, allowing the water to be by-passed around the jacket until the running temperature is attained. There are two points of water intake, these being located between the first and second and between the third and fourth cylinders on the left side of the block. The water is guided around to the right side on which the valves are located. A feature of the engine is the large jacket space around the heads of the cylinders and between the cylinders themselves. There is also an exceptional amount of water around the valves, as will be apparent from the sectional views of the engine. The capacity of the water system is  $9\frac{3}{4}$  gal.

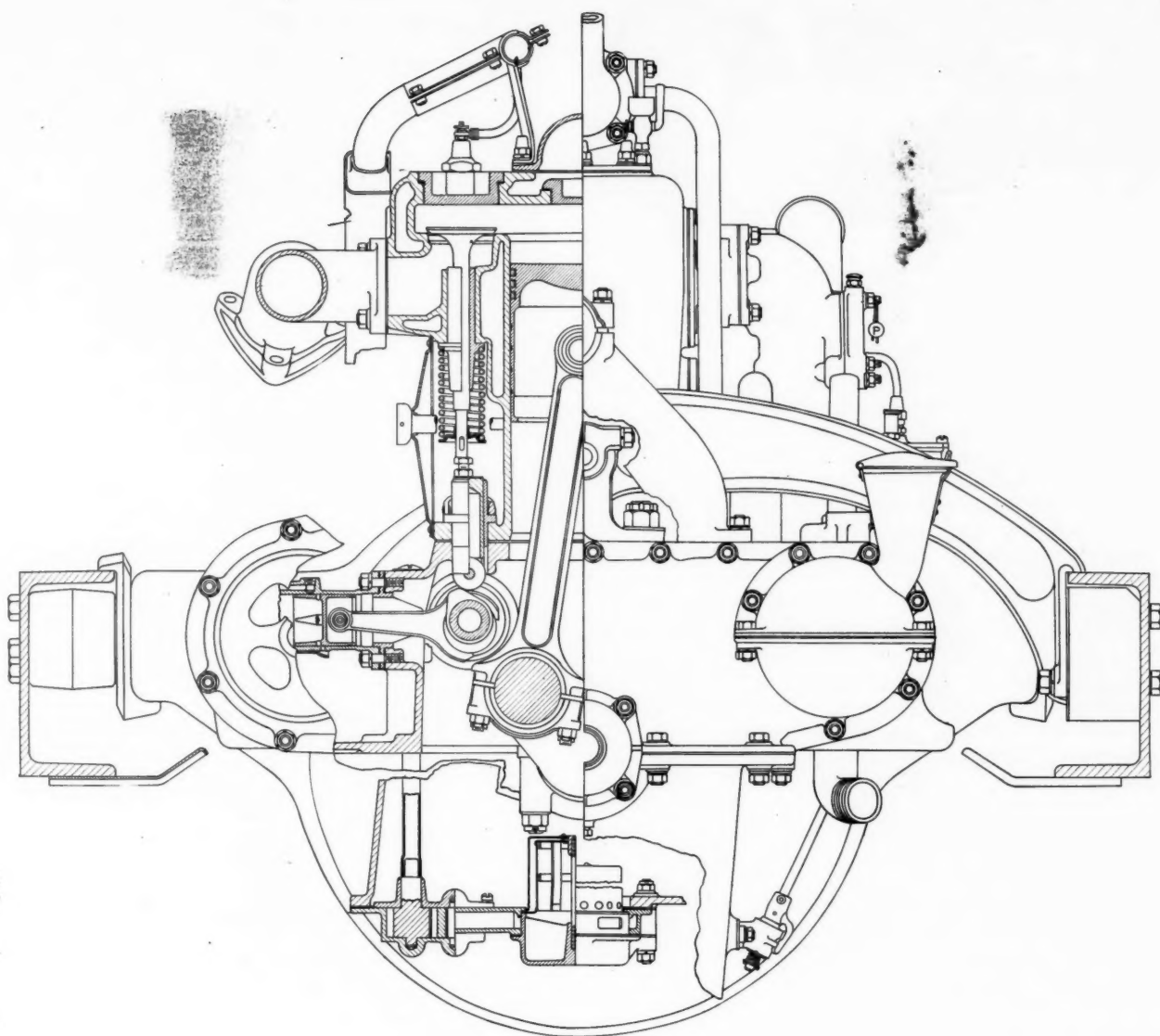
Gasoline is fed by pressure to a Packard carburetor of the plain tube, fixed Venturi type. This is a water-jacketed unit with a single nozzle. The governor throttle is located above the hand-operated throttle and is controlled by a fly-ball type of governor set to operate at 1600 r.p.m.

The clutch is a dry disk unit with five disks, the driving disks being covered with woven asbestos material on both sides. The clutch spring surrounds the shaft and the end thrust is taken by annular ball bearing. The gearset is a four-speed, selective type, mounted amidships. The

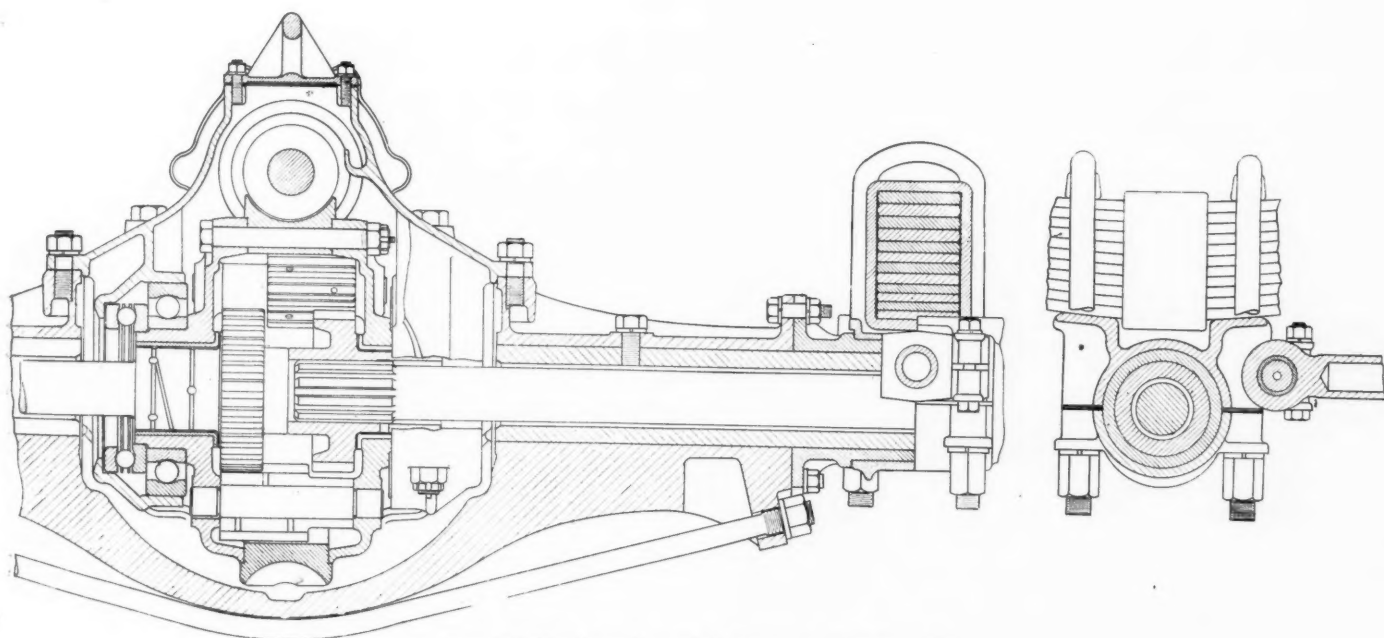


*Parts section and cross section of the Packard gearset assembly*

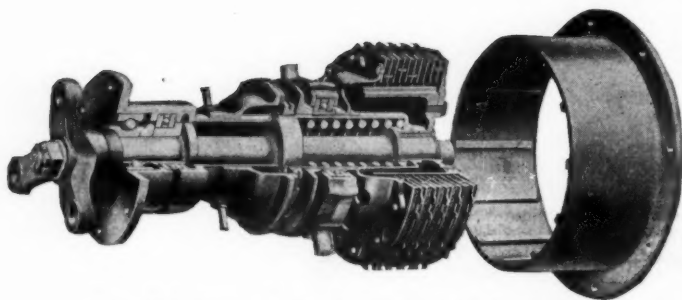




*Plan and section of the Packard engine*

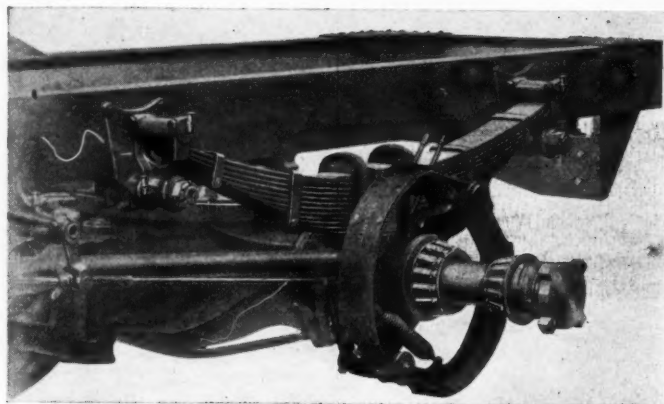


*Longitudinal section of the rear axle assembly*



*Dry disk type of clutch used on Packard pneumatic truck*

*To the right—Rear spring and wheel mounting on Packard truck*



main shaft is carried on four annular bearings. The reductions to the gearbox are as follows: high, 1 to 1; third, 1.48 to 1; second, 2.56 to 1; first, 4.6 to 1; reverse, 6 to 1.

The final drive is by an overhead worm with a 9 to 1 ratio. The differential is a spur gear type, concentrically mounted within the worm wheel. The minimum diameter of the rear axle driving members is  $1\frac{7}{8}$  in. The tread from center to center of the rear wheels is  $68\frac{5}{8}$  in. and on the front wheels is  $69\frac{3}{8}$  in. The tire sizes are 44 x 10 in., rear, and 38 x 7 in., front. It is in the tire size that the real reason for the larger capacity engine exists. Owing to the great increase in the outside diameter of the pneumatic over the solid-tired wheels, the ability of the truck drops off. To restore it to the same value as with the solid-tired truck, the larger engine is used.

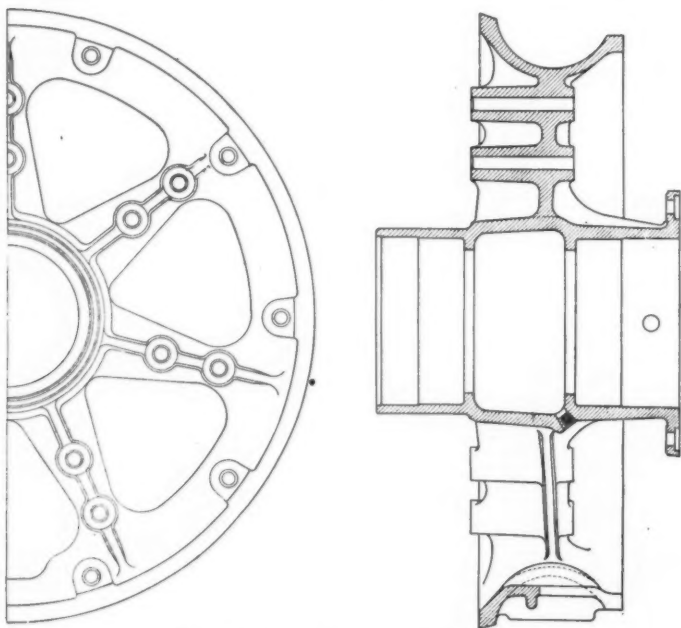
The rear axle torque is taken by a torque arm mounted on the axle housing just forward of the worm wheel and below the worm case. The forward end of the torque rod is connected with a frame cross-member. The truck is driven through radius rods; the frame is of channel construction, the depth being 6 in., the flange width 2-13/16 in. and the weight of the channel 13 lb. per foot. The front axle is an I-beam,  $2\frac{1}{2}$  x  $3\frac{1}{4}$  in. The road clearance is  $13\frac{3}{4}$  in. and the point of least clearance is at the center of the rear axle. The springs are semi-elliptic, the front being 3 in. x  $42\frac{3}{8}$  in., and the rear 3 in. x 46 in. The spring bolts are all  $\frac{7}{8}$  in. With a 13-ft. wheelbase, the truck has a turning radius of 28 ft. and with a 15 ft. 6 in. wheelbase a turning radius of 33 ft. The wheels are cast

steel with six spokes in front and seven spokes in the rear. The foot brake is an external type, mounted on the drive shaft, the hand brake being an internal rear wheel type.

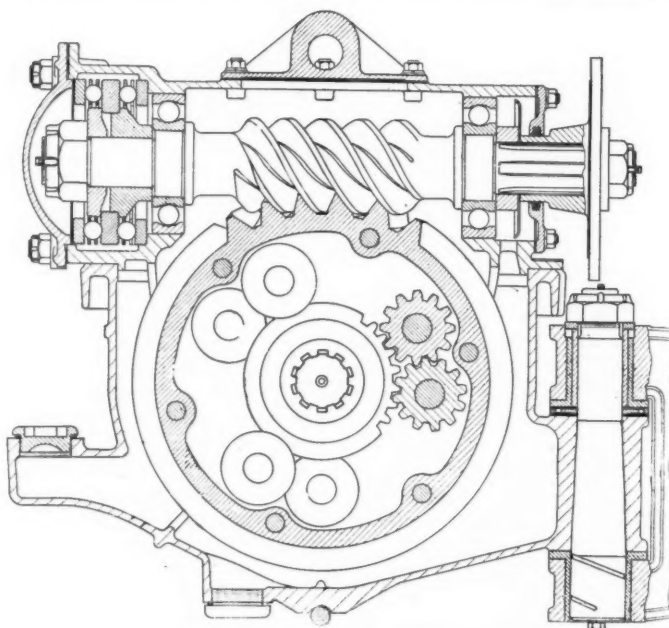
The chassis weight of the 13-ft. wheelbase truck is estimated at 7250 lb. Of this 3450 lb. is on the front wheels and 3800 lb. on the rear. With a body weighing 1000 lb. (the maximum body allowance), the total weight is 9250 lb., of which 3650 lb. is on the front wheels and 5600 lb. on the rear. In the case of the 15½-ft. wheelbase chassis with full weight body, the total weight is 9360 lb., of which 3650 lb. is on the front wheels and 5710 lb. on the rear.

In addition to the model Y described, the Packard company is making two other pneumatic tired trucks. These are 1½- and 2-ton capacity, thus giving a range of three models. Modifications for each have been made from solid-tire practice in the way of wheel equipment and means for inflating the giant pneumatic tires. The tire sizes are in accordance with the S.A.E. capacity ratings, or larger. The rim equipment is of the demountable type provided for the purpose of facilitating the handling of the giant size tires.

In order to make the handling of tires as easy as possible, metal wheels of the spoke type have been employed, this construction permitting the use of a slot in the rim for the valve stem. With this slotted rim, it is possible to assemble the tire on the wheel by rolling it into position rather than by sliding it over the wheels and instead



*Half plan and section of wheel*



*Longitudinal section of worm assembly*



1½-TON MODEL BODY DIMENSIONS

| Wheelbase |                   | LENGTHS |       |       | WIDTHS          |              |            | Heights (Not Loaded) |          |                    |
|-----------|-------------------|---------|-------|-------|-----------------|--------------|------------|----------------------|----------|--------------------|
|           |                   | Std.    | Min.  | Max.  | Chassis Overall | Body Overall | Body Clear | Truck Overall        | With Top | Body Floor at Rear |
| 12-0      | Body Clear.....   | 10- 2¾  | 8-0¾  | 11-8¾ |                 |              |            |                      |          |                    |
|           | Back of Seat..... | 10- 6   | 9- 1  | 12-0  | 5-10¾           | 5-5¾         | 5-0        | 5-11                 | 7-11½    | 3-11               |
|           | Truck Overall.... | 17-11¾  | 16-6¾ | 19-5¾ |                 |              |            |                      |          |                    |
| 14-0      | Body Clear.....   | 13- 8¾  | 11-8¾ | 15-8¾ |                 |              |            |                      |          |                    |
|           | Back of Seat..... | 14- 0   | 12-0  | 16-0  |                 |              |            |                      |          |                    |
|           | Truck Overall.... | 21- 5¾  | 19-5¾ | 23-5¾ |                 |              |            |                      |          |                    |

2-TON MODEL BODY DIMENSIONS

| Wheelbase |                   | LENGTHS |       |       | WIDTHS          |              |            | Heights (Not Loaded) |          |                    |
|-----------|-------------------|---------|-------|-------|-----------------|--------------|------------|----------------------|----------|--------------------|
|           |                   | Std.    | Min.  | Max.  | Chassis Overall | Body Overall | Body Clear | Truck Overall        | With Top | Body Floor at Rear |
| 12-0      | Body Clear.....   | 10-7½   | 8-8½  | 12-1½ |                 |              |            |                      |          |                    |
|           | Back of Seat..... | 11-0    | 9-1   | 12-6  | 6-2¾            | 5-7¾         | 5-0        | 6-2½                 | 8-1      | 4-2½               |
|           | Truck Overall.... | 18-6½   | 16-7½ | 20-0½ |                 |              |            |                      |          |                    |
| 14-0      | Body Clear.....   | 13-7½   | 12-1½ | 15-7½ |                 |              |            |                      |          |                    |
|           | Back of Seat..... | 14-0    | 12-6  | 16-0  |                 |              |            |                      |          |                    |
|           | Truck Overall.... | 21-6½   | 20-0½ | 23-6½ |                 |              |            |                      |          |                    |

3-TON MODEL BODY DIMENSIONS

| Wheelbase |                   | LENGTHS |        |       | WIDTHS          |              |            | Heights (Not Loaded) |          |                    |
|-----------|-------------------|---------|--------|-------|-----------------|--------------|------------|----------------------|----------|--------------------|
|           |                   | Std.    | Min.   | Max.  | Chassis Overall | Body Overall | Body Clear | Truck Overall        | With Top | Body Floor at Rear |
| 13-0      | Body Clear.....   | 11- 7½  | 9- 7½  | 13-1½ |                 |              |            |                      |          |                    |
|           | Back of Seat..... | 12- 0   | 10- 0  | 13-6  | 7-4             | 6-7¾         | 6-0        | 6-7                  | 8-5      | 4-7                |
|           | Truck Overall.... | 19-10½  | 17-10½ | 21-4½ |                 |              |            |                      |          |                    |
| 15-6      | Body Clear.....   | 15- 7½  | 13- 1½ | 18-1½ |                 |              |            |                      |          |                    |
|           | Back of Seat..... | 16- 0   | 13- 6  | 18-6  |                 |              |            |                      |          |                    |
|           | Truck Overall.... | 23-10½  | 21- 4½ | 26-4½ |                 |              |            |                      |          |                    |

of the more difficult method of lifting the tire and rim assembly for the purpose of inserting the valve stem through a hole in the rim.

In providing for the proper ability without employing high motor speeds, it has been found necessary to equip the 1½- and 2-ton models with the 4-3/16 x 5½ in. engine. Ample radiating capacity has been provided by using the same size radiator on the 3-ton pneumatic tired truck as with the same size engine on the 5-ton solid.

On the 1½-ton pneumatic chassis, the maximum allowable weight above the chassis, including the body load, is 4250 lb., giving a body weight of 1250 lb., which must not be exceeded in order to carry capacity load. The 1½-ton pneumatic truck has the standard Packard 30 m.p.h. axle gears, giving a ratio of 7 to 1 in high at 30 m.p.h., 10.4 to 1 on third at 20.2 m.p.h., 18 to 1 on second at 11.68 m.p.h., and 32.14 to 1 at 6.53 m.p.h. On first, the gear ratio is 42.2 to 1, giving a speed of 5 m.p.h.

The tire equipment on the 1½-ton size is 36 x 6 in., front, and 38 x 7 in., rear. It has a tread of 56 in. at both front and rear and a turning radius on the 12-ft. wheelbase chassis of 23.5 ft., and on the 14-ft. wheelbase of 25.5 ft. The wheels are of the metal spoke type, both front and rear having six spokes. The engine is a four-bearing crankshaft job, having a total projected area of the crankshaft bearing of 24.3 sq. in. and on the connecting rod bearings, measured on the crankshaft, 19.125 sq. in. The crankshaft is 2½ in. in diameter. The frame is channel structure, 6 in. in depth with 1-59/64-in. flange width and a weight of channel per foot of 8 lb. This truck has a clearance of 12½ in. from the bottom of the rear axle to the ground.

The 2-ton truck has a maximum allowable weight above the chassis, including body and load, of 5500 lb., allowing a 1500-lb. body to carry capacity weight. This truck is designed with a 27 m.p.h. axle, giving on high gear of

27 m.p.h. a ratio of 8 to 1. On third speed it has a ratio of 11.8 to 1, which gives 18.3 m.p.h. On second it is geared at 20.57 to 1, with a speed of 10.5 m.p.h., and on low, 36.7 to 1, with a speed of 5.9 m.p.h. On reverse, the gear ratio is 48.2 to 1, which corresponds with 4.5 m.p.h.

The tires utilized on the 2-ton truck are 36 x 6 in., front, and 40 x 8 in., rear. The tread from center to center of the front wheel is 58½ in. and at the rear 55½ in. The turning radius of the 2-ton truck is 24 ft. on the 12-ft. wheelbase and 26 ft. on the 14-ft. wheelbase. Both the front and rear wheels are of the metal spoke type, having 6 spokes. The clearance is 12½-in. minimum, this distance being from the bottom of the rear axle to the ground.

The engine is a four-bearing type with a total projected area of 24.3 sq. in. on the crankshaft. The crankshaft diameter is 2½ in. The total projected area of the connecting rod bearings is 19.125 sq. in.

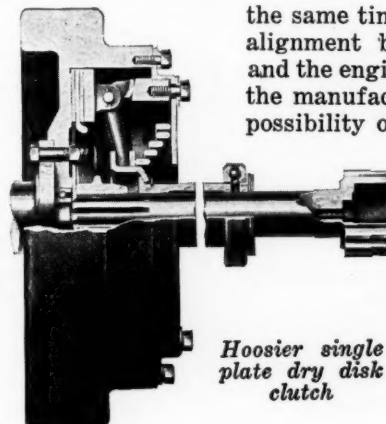
Any standard bodies may be mounted on these chassis and a tabulation is given herewith of the standard body dimensions on the 1½, 2 and 3 ton trucks.

## Non-chattering Clutch

THE illustration gives but a general idea of the clutch referred to in the title, but there are a number of special features which can be explained without the use of a diagram. In the first place, the makers claim for this device an easy and simple adjustment of the friction disks to compensate for wear. The rapid and positive disengagement is said to eliminate any tendency to drag when releasing.

Powerful leverage is afforded by three clamping levers, the design making possible the use of lighter springs than usual in this type, resulting in an easy operation of the pedal.

Another feature is the special design of the disengaging sleeve with its spherical seat within the clamping lever collar, providing equal pressure on all three levers, and at



Hoosier single  
plate dry disk  
clutch

the same time taking care of any misalignment between the transmission and the engine. This is accomplished, the manufacturers state, without any possibility of binding on disengaging sleeve, thus making a full-floating sleeve. The lever seat centers the pressure plate to which the levers are attached, the object being the elimination of brake chatter. The clutch is manufactured by the Hoosier Auto Parts Co.

# Duesenberg Racing Design Continued in Rochester Engine

Production has commenced of this modified power unit, it being used on Meteor, Revere and Roamer cars. The engine has the characteristic horizontal valve action of the Duesenberg product and only a few changes have been made on it. This article details its salient features.

**W**HEN the Duesenberg Motors Corp. was taken over by the Willys Corp., an arrangement was consummated whereby the manufacturing rights for the 4 x 6 in. Model G Duesenberg engine were obtained by the Rochester Motors Co., Inc., a firm that for several years had been building airplane parts for Curtiss and other companies. Before production was started at the Rochester plant, several changes were made in the Model G engine, some of which were suggested by Fred S. Duesenberg, the original designer of the engine.

The Rochester company is now in production on this engine and it is being used in the Meteor, Revere and Roamer cars. It is a development of the Duesenberg racing type that has been seen on the speedways during the past five years. The engine has the horizontal valve action characteristic of all the Duesenbergs and is cast en bloc. The ends of the water jacketing are left open and aluminum end plates, fastened with cap screws, permit easy access to the water jacket for cleaning out sediment. They also facilitate the setting of cores and insure uniform wall thickness of the casting.

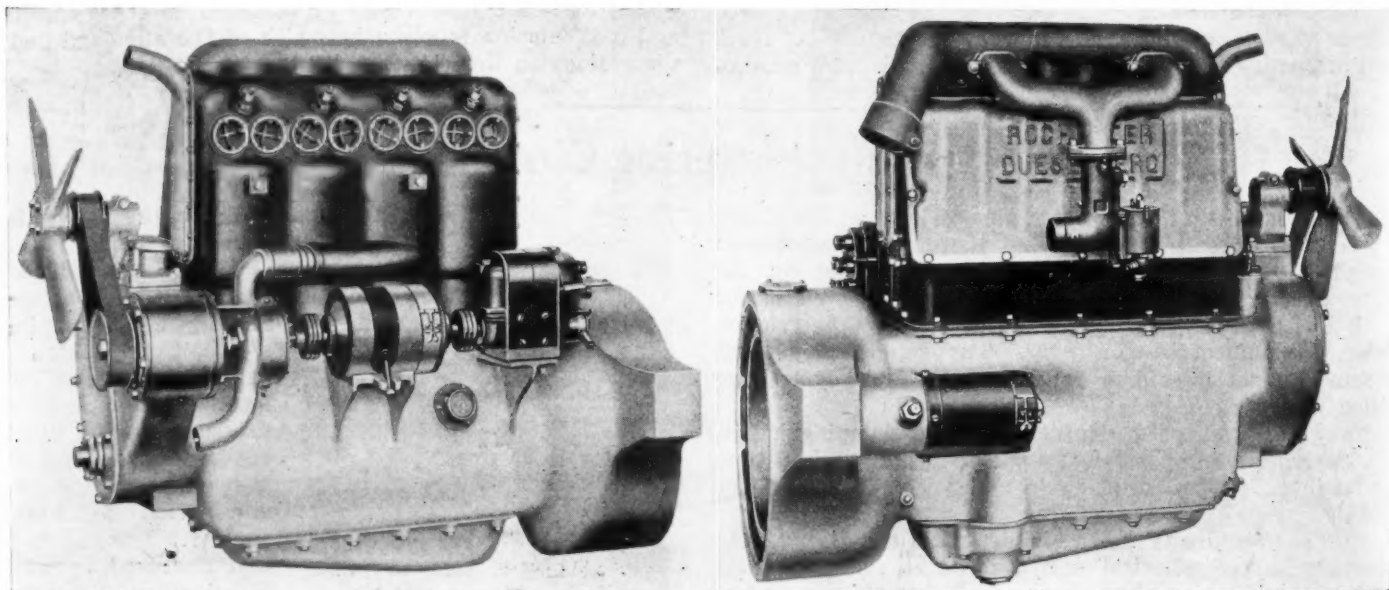
The pistons are Magnalite aluminum alloy of rather heavy section for heat transmission, but still are light in weight. The head is particularly heavily ribbed to dissipate heat and to insure uniform expansion. There are three piston rings, the Burd high compression type used on top and two American hammered rings underneath. The piston pins are Shelby steel tubing, hardened and ground.

The drop forged, chrome vanadium I-beam connecting rods have the piston pins clamped in the upper end with the bearing formed by the piston boss. The big end bearing cap is fastened with four bolts and the bearings at this end are bronze, babbitt lined, removable and adjustable.

The two-bearing crankshaft is of Wyman & Gordon counterbalanced type with crankpins and main journals 2-5/16 in. in diameter. The checks are drilled diagonally from the main bearings for pressure feed lubrication. The main bearings are bronze, babbitt lined and are removable and adjustable.

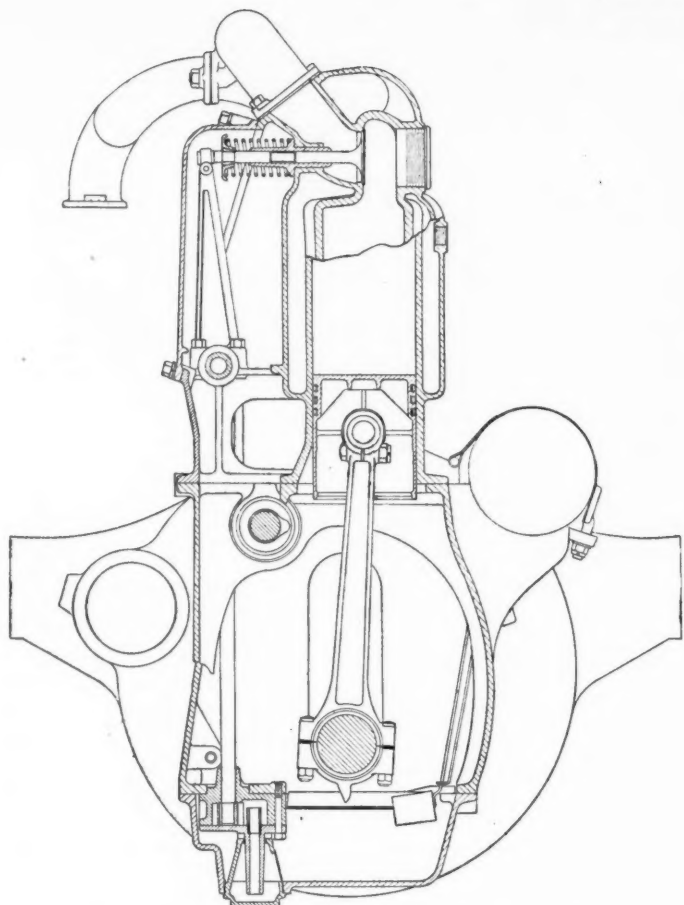
In the aluminum one-piece crankcase, the front bearing is integral with the crankcase and lined with a babbitt-bronze, one-piece bushing. The rear bearing is split for adjustment and is contained in a conical aluminum housing, which in turn is accurately fitted and bolted to a recess in the crankcase. The crankcase is ribbed generously throughout, the entire assembly being designed particularly for rigidity and accuracy in alignment. The oil pan also is of aluminum and is bolted to the crankcase.

The camshaft, water pump, generator and magneto are driven by a silent chain from the crankshaft. The chains and gears are the product of the Link-Belt Co. The camshaft is carbon steel, drop forged with cams and helical pump gear integral, the camshaft bearings being Non Gran bronze. The intake valves are carbon steel, 2-3/16 in. diameter. The exhaust valves are of the same diameter, but of tungsten steel. The valve spring retainer



*Rochester-Duesenberg engine*



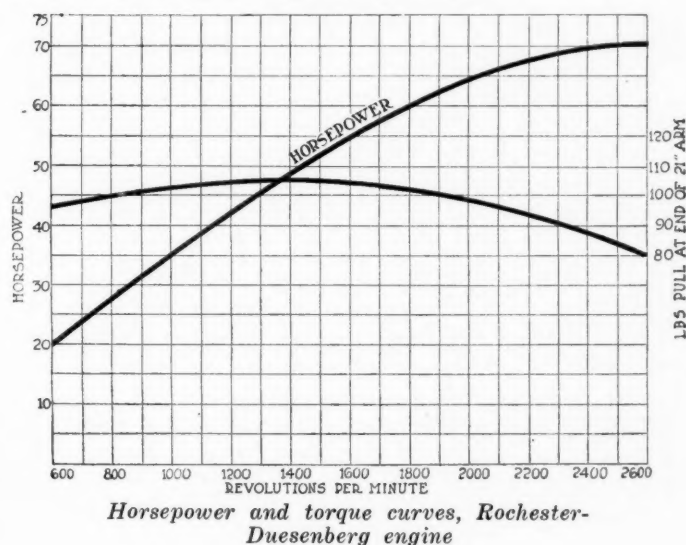


*Cross sectional view of Rochester-Duesenberg engine*

is secured by means of a split taper cone and the valve rocker arms, actuated in the customary Duesenberg manner, are drop forged, nickel steel with a cam roller at the lower end and an adjusting screw at the upper end. The fulcrum bearing is bushed with Non Gran bronze. The

rocker arm shaft, which carries all of the rockers, is Shelby steel tubing, hardened and ground. Each shaft supports eight rocker arms and the entire valve actuating mechanism is enclosed in an oil-tight chamber with a removable cover plate. Lubrication is by pressure feed to the main connecting rod, camshaft and rocker arm bearings. Overflow from a relief valve in the pressure line feeds the silent chain, timing gears and pump shaft. The pistons, piston pins, cams and cam rollers are lubricated by the spray from the upper end of the rods. Cooling is by an impeller type of circulating pump and for carburetion and gasoline feed any standard units can be applied. The engine is also adapted to take standard mountings for generators and starting motors. Ignition can also be by any of the standard applications.

The performance of the engine is shown by the accompanying horsepower and torque curves. They indicate a maximum of 70 hp. at about 2600 r.p.m. and maximum torque of 105 ft. lb. at between 1200 and 1500 r.p.m. The curves were made with a 1½-in. Stromberg carbureter, Bosch magneto and Rajah spark plugs.



## Dynamometer Tests at Lincoln Tractor Trials

AT the time of the autumn tractor trials at Lincoln, England, J. E. Martin, of the Hyatt Roller Bearing Co., went to that country with the firm's traction dynamometer and it was generally understood then that he was to have charge of the dynamometer tests. Later, when it was learned that a dynamometer built by the National Physical Laboratory was used for nearly all the tests and when no mention was made of Martin and his dynamometer, in reports of the trials, considerable curiosity was expressed regarding the arrangements that had existed between Martin and the trials management. This matter is now cleared up by a letter received from H. Scott Hall, who was organizer of the exhibition.

Hall writes that at the time he took over the organization of the trials, two tentative inquiries have been made by the committee among British manufacturers of drawbar dynamometers to ascertain if a dynamometer with recording apparatus were in existence. These inquiries led to no definite results. Being aware that the Hyatt company had such an instrument, which they were accustomed to demonstrate at tractor meetings, he wrote that concern asking if it would lend him the dynamometer. In the meantime search for an English recording dyna-

nometer was continued, and, between the time the letter to the Hyatt company was mailed and a reply received from it, Hall succeeded in getting the National Physical Laboratory to complete an instrument, portions of which were already in existence.

After the laboratory had started its work Hall received an offer from the Hyatt company that it not only would send the instrument, but also a man to supervise and operate it. As there were from 30 to 40 tractors to be tested in the short space of two days, Hall decided to accept this offer, and Martin went to England to assist in the tests.

It happened that the instrument made by the National Physical Laboratory proved to be rather better suited to the particular work at Lincoln than that of the Hyatt company, for the reason that the records on the British machine were taken on a continuous roll of paper. Thus the tests could be continued right along, whereas on the Hyatt instrument a new sheet of paper has to be fitted between succeeding tests. Considerable use was made of the Hyatt instrument for testing soil resistance in the various fields, for which purpose the British machine was practically useless.

# Analysis of German Trucks by the Motor Transport Corps

This article continues the report on the trucks surrendered to the A. E. F. under the terms of the armistice. The results of the investigations and tests are being made public as rapidly as they are completed for each truck.

By C. R. Hays\*

## Durkopp

THE engine is a four-cylinder, with  $4\frac{1}{2}$  x  $5\frac{1}{2}$  in. bore and stroke; four point suspension; suspension from the upper half of the crankcase. The cylinders are cast in block with right-hand valves with exhaust ports tapered to the rear of the motor with five sq. in. of area. The carbureter intake on the left side of the engine runs through to the right side forming a Y shaped passage leading to two adjoining intake valves. The water enters on the front end of the engine, flowing around valve seats and guides to the rear of the engine where it returns and circulates around the cylinders, rises and is discharged through a two-way manifold at the front end of the engine. The water space in the top cylinder is formed by a separate detachable cast iron jacket, which leaves a space of  $2\frac{1}{2}$  in. from the top of the water jacket to the top of the cylinders. This cast dome jacket, running the full length of the block, is held down by four studs, which are drilled and used as priming cup inlets to the cylinders. The water does not completely surround the cylinders because each two of the cylinders are cast together, the water jacket running half the length of the cylinder.

Cylinders are flat combustion chambers and chamfered at the bottom, held down with 10 stud bolts, five on each side; the valve guides are cast integral with the cylinders and are 3 in. long. The cylinder walls are  $\frac{3}{8}$  in. thick. The casting is a detachable cast iron plate so that the valves are fully enclosed from dust. This block is a good piece of foundry work.

Flywheel is of cast iron, semi-finished all over, 19 in. in dia., width  $5\frac{1}{2}$  in., rim  $2\frac{1}{2}$  in., counterbored 4 in. for cone clutch. Flywheel is two piece to permit the use of an inverted cone clutch.

### Crankcase, Crankshaft and Bearings

The upper half of the crankcase is of cast iron with no special features in construction, the walls being approximately  $\frac{5}{16}$  in. thick. The lower half of the crankcase is of pressed steel, which composes the oil sump and contains four pressed steel individual oil troughs for the connecting rod scuppers. These troughs are held into the case by four  $\frac{3}{16}$  in. fillister head screws. The lower half of the crankcase carries a  $\frac{1}{8}$  in. fiber gasket, which is riveted onto the case. The lower half of the case is held to the upper half by thirty-five  $\frac{1}{4}$  in. studs.

Crankshaft is a built-up shaft, comprising three drop forgings and two cast steel parts. The front forging carries the timing gear, front crankshaft bearing and one rod

bearing. This is connected to the circular steel casting with tapers, two  $\frac{3}{8}$  in. x 1 in. dowels and nut. The second or center forging carries the center crankshaft bearing and two rod bearings, one on each end, this being fastened at each end to the circular casting with taper, two  $\frac{3}{8}$  in. x 1 in. dowels, and nut. The third forging carries one connecting rod bearing, two crankshaft bearings and the flywheel hub, the hub being a separate steel forging held on by nut and straight key. This is fastened to the circular cast steel part with taper, two  $\frac{3}{8}$  in. x 1 in., two dowels and nut.

The assembly is drawn together by the nuts. After alignment and balancing, the nuts are removed and the dowel holes are drilled in half the forging and casting. The dowel is inserted and the nut replaced. Crankshaft has four plain roller bearings: front, center and two rear with two ball thrusts. The four roller bearings are of the same size, having fifteen  $\frac{19}{32}$  x  $\frac{5}{8}$  rollers hardened and ground, with  $\frac{1}{8}$  in. x  $\frac{1}{8}$  in. recess shoulders on each end, which extends through a  $\frac{1}{8}$  in. x  $\frac{1}{2}$  in. hardened and ground steel ring. The inner and outer race also has  $\frac{1}{8}$  in. counterbore. To assemble the bearing the inner and outer are separated by inserting the rollers. The rollers are separated by adding on each side the steel discs. The discs are held by three  $\frac{3}{16}$  in. screws, making a self-contained bearing with all edges flushed. The front and two rear bearings have races which are held in place by a straight key. The center bearing has no race, as the rollers are run on the shaft, which is hardened and ground. By taking out the three screws the discs on each side can be removed, allowing the rollers to be pulled out. The outer race then will slide around the throws of the shaft. Crankshaft bearings are held in the upper half of case by two  $\frac{1}{2}$  in. studs and steel caps.

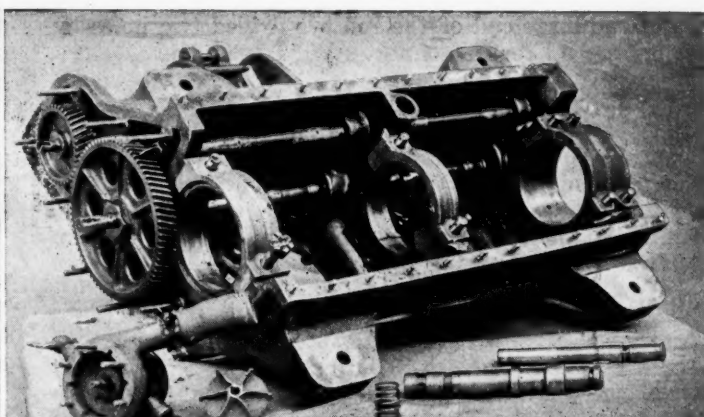
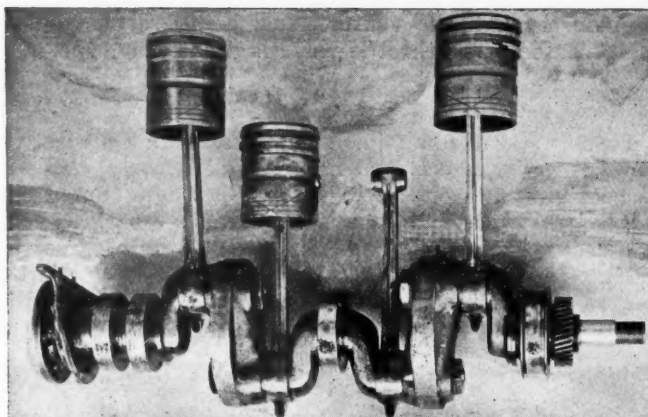
### Connecting Rods and Bearings

Connecting rods are I-beam, drop forgings, semi-finished, with caps and oil scuppers forged integral with the rod, the scuppers being extra large. Running the full length of the rod on each edge are oil collection channels, which collect the oil and by-pass it through  $\frac{1}{4}$  in. holes to the connecting rod bearings.

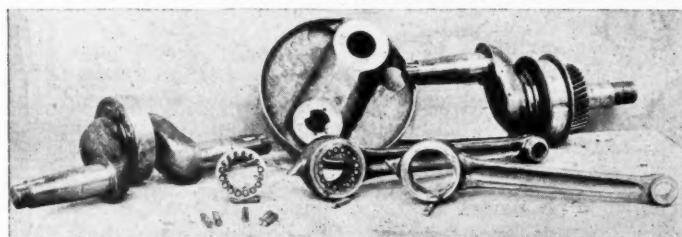
Connecting rod bearings are of the plain roller type, composed of sixteen  $\frac{5}{16}$  in. x  $1\frac{1}{8}$  in. rollers hardened and ground. The rollers are held in a soft steel retainer, machined out of solid stock. Pressed into the connecting rod is the outer roller race, which is  $\frac{1}{8}$  in. less in length than the width of the rod. This forms a recess so when the retainer is inserted the outer edges of the bearing are flush with the rod. No inner race is used, as the rollers

\*Mr. Hays is chief of the experimental section, Motor Transport Corps.





Crankcase, water pump and oil pump



Above—Crankshaft, connecting rods and pistons assembled. Below—Disassembled connecting rods, crankshaft front and center halves and counterbalance

are in contact with the crankshaft, which is hardened and ground at the roller contact only. Piston pin bearings are hardened and ground steel bushings and press into the connecting rod.

#### Pistons and Pins

Flat head type with a cross system of webbing on the inside. The head of the piston has a  $\frac{1}{8}$ -in. x  $\frac{1}{8}$ -in. V-shaped groove running around the outer edge of the head. The piston has three  $\frac{1}{4}$  in. concentric hammered lap joint compression rings, these rings being  $4\frac{3}{8}$  in. in diameter when loose by  $\frac{1}{8}$  in. thick. The top ring sets within  $\frac{3}{16}$  in. of the top of the piston with a space of  $\frac{7}{16}$  in. between the other two rings. In the center of this space there is a  $\frac{1}{32}$  in. x  $\frac{1}{32}$  in. oil groove. There are three  $\frac{1}{32}$  in. x  $\frac{1}{32}$  in. oil grooves in the skirt, with four of the same size grooves, forming a V, leading from the bottom groove on the skirt up to the piston pins. The piston is milled off around the area to allow for the expansion of the piston pin bosses. There are two  $\frac{3}{16}$  in. holes on each side of piston pin and at each end, for passing the oil down to a groove on the piston pin, where it flows and lubricates the piston pin bushing. The piston pin is  $\frac{7}{8}$  in. in diameter and  $3\frac{1}{2}$  in. from top of piston, the pin being held in place by set screw and cotter key. There is a large crescent-shaped groove  $\frac{1}{2}$  in. wide x  $\frac{3}{64}$  in. deep running around at the location of the piston pin. The piston is  $5\frac{1}{2}$  in. long, and on the inside of this skirt there is a  $\frac{1}{8}$  in. rib running around the lower end, the skirt being  $\frac{3}{32}$  in. thick. The piston pin is constructed out of steel tubing hardened and ground. All pistons are ground.

#### Timing Gears

Spiral type with soft forged steel gears on the crankshaft and magneto drive. The camshaft gear is a spider cast-iron gear. Timing gear on the end of the crankshaft is 4 in. outside diameter, having 39 teeth with 1 in. face,  $\frac{7}{64}$  in. deep and  $\frac{5}{64}$  width at base of tooth. The magneto driving gear is of the same type and construction. The camshaft gear is held on by straight key and nut on to the camshaft.

The camshaft is a forging with the cam forged integral,  $1\frac{5}{16}$  in. in diameter, supported at each end with annular type ball bearings, the center supported by plain, split bronze bushing. The true radius of the cams is  $1\frac{7}{16}$  in., the face of the cams being  $\frac{5}{8}$  in. with  $\frac{5}{16}$  in. lift. This shaft is ground finished all over, hardened only on the cams.

#### Valves

Mushroom type,  $1\frac{3}{4}$  in. in diameter,  $\frac{1}{8}$  in. wide, 30 deg. seat. These valves are two-piece construction with the lower end hard. Valves  $8\frac{1}{4}$  in. long with a  $\frac{3}{8}$  in. diameter stem. The springs are the straight type spring held with a machined cap, the cap being held with a  $\frac{1}{8}$  in. x  $\frac{1}{2}$  in. straight key going through a broached hole on the valve stem. The valve cap plugs are malleable cast iron, tapped for metric plugs.

#### Governor

Fly ball type, located into the fan belt driving pulley on the end of the crankshaft. The motion is taken away from the governor by a fork bell crank roller arm, working in a sliding sleeve, which is of bronze and slides back and forth on the pulley hub. Fan pulley is fastened on the crankshaft by a straight key through the hub, held on by the starting crank clutch, which is screwed into the end of the crankshaft.

#### Oiling System

The oiling system is a plunger pump, driven by an auxiliary cam on the camshaft, running down into the lower half of the crankcase. The plunger is a  $\frac{13}{16}$  in. diameter steel tubing 8 in. long, one end plugged to form the  $\frac{3}{8}$  in. ball check seat. This is the suction end. The other end is plugged with a crown cap, which comes in contact with the cam. The barrel of this pump is of cast iron construction, there being a spring working between the crown head plunger and end of the pump barrel to keep the plunger following the cam; this is compressed with the cam and forces the oil out through by-passes in the plunger and the plunger barrel. From there the oil is forced into a  $\frac{3}{4}$ -in. steel tubing conduit, running the length of the crankcase, having four  $\frac{1}{8}$ -in. holes drilled to where the oil flows into the troughs in the lower half of the crankcase, where it is picked up by the scuppers on the cap of the connecting rod. One end of the oil conduit leads to the timing gear case and is plugged to discharge a  $\frac{1}{8}$  in. stream of oil onto the timing gears. The balance of the lubrication of the motor is by splash system, there being a channel on each side of the connecting rod, leading from the large end up to the wristpin bushing. At the



base of the large end of the rod are drilled two holes by-passing the oil to the connecting rod bearings.

#### Water System

Three-in. six blade bronze cast impeller pump. Water entrance to the pump is through the center, having a  $\frac{7}{8}$  in. discharge and a  $\frac{7}{8}$  in. intake. The width of the pump impeller blades is  $\frac{1}{2}$  in. This pump is located on the front end of the timing gear case and is driven by a coupling from the magneto drive shaft.

#### Ignition

Ignition system is a single system high tension type F. E. 4 D. Mea magneto. The magneto is clockwise and the advance is by advancing the magnetic field in opposite direction of rotation of the armature. Magneto is placed on the right hand side of the engine and is driven by a cross shaft, which is driven by a spiral gear off of the camshaft in rear of the camshaft timing gear. The high tension wires are enclosed in a fiber tube, which is bolted onto the side of the cylinders. For checking up the position of the secondary distributor rotor, there is placed in the secondary distributor cover a celluloid window opposite contact for number one cylinder.

Carbureter is a vertical Pallas, type IV,  $1\frac{5}{8}$  in., with a 28 mm. venturi throat. The float is of cork and is shellacked. The carbureter is of cast bronze with an aluminum bowl, having a hot-air attachment. The idle adjustment is by a stationary well. The high speed is through a well running

angular through the venturi, fuel being restricted by a compensator. The throttle valve is a butterfly type.

#### Fan

Twenty and one-half in. in diameter. Five blades with rim. Material, sheet steel riveted to sheet steel hub with a sheet steel fan pulley. The fan shaft is mounted on a ball bearing with no adjustment. The fan bracket consists of a cast iron bracket with clamped end holding a vertical shaft. The vertical shaft has an adjustment on the bottom, consisting of an adjusting screw and check nut, which raises the shaft up or down in the bracket.

#### Weights

Connecting rod and piston complete, 9 lb. 12 oz.

Valve, 9 oz.

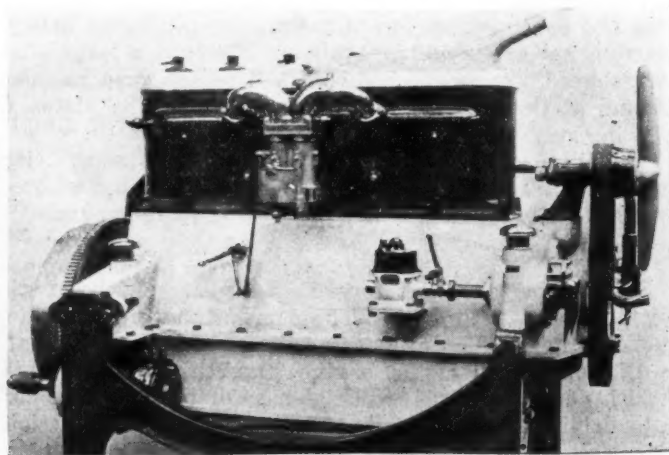
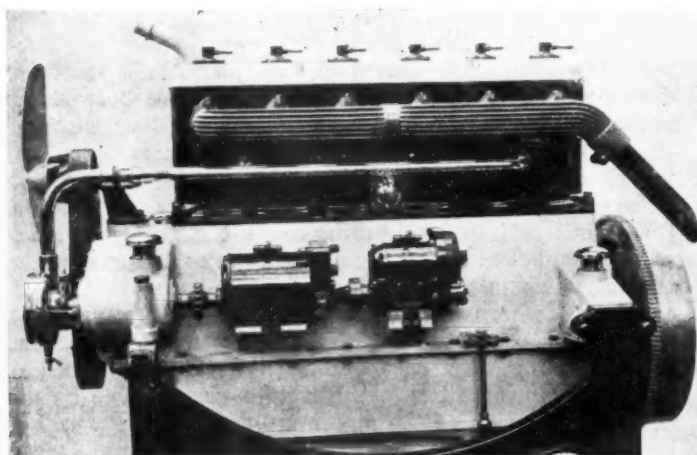
Valve spring, 4 oz.

The workmanship upon this engine is high grade, notably the cylinder block casting. The pistons show good workmanship, valve springs being nickel plated and individual fittings on all parts; the built-up crankshaft is of first-class construction. This engine is very compact and simple and has no excess weight of parts. It would make a good service job, excepting for the built-up crankshaft, there being no adjustment to either the rods or crankshaft bearings. Replacement of the rollers by a good mechanic could be easily accomplished. In general, the engine follows American practice.

## New Minerva-Knight Engine Design

**A**N entirely new design of Knight engine, a six-cylinder 90 x 140 mm., has been completed by the Minerva Works of Antwerp, Belgium, and will be in production in March. It is a very clean-looking design, with integral intake manifold and separate exhaust manifold. On the exhaust side, the water pump, electric generator and magneto are in line, the water pump being ahead of the timing gear housing and the two other parts to the rear of it. On the opposite side the oil pump is ahead of the timing gear housing and Kellogg tire pump to the rear. The electric starting motor is on the same side but under the rear crankcase hanger, its pinion engaging with an external gear on the flywheel. The two blade aluminum fan is belt-driven from the crankshaft and can be put into or thrown out of engagement by a jaw clutch.

The crankshaft is counterweighted and balanced and is carried in seven plain bearings. Connecting rods are tubular and pistons are aluminum. A duplex Zenith carbureter is fitted and is connected to the cast manifold by a water jacketed Y intake pipe. All the hot air for the carbureter is drawn from the crankcase and for this purpose four breathers are fitted, one on each hanger. In addition, there is, between the third and fourth cylinders, on the exhaust side, an air intake with an adjustable shutter, this supplying air to the carbureter through a gauze filter, when the crankcase air is too hot. To facilitate starting, gasoline can be sprayed from the dash into the cast intake manifold. It is stated that a four-cylinder engine of the same bore and stroke and the same general design will also be produced.



Minerva 6-cylinder Knight engine

# The Growing Need for Accurate Testing Instruments

The increasing importance of having testing instruments in the up-to-date factory was emphasized at an exhibit by the American Society of Mechanical Inspectors. Some of the inspection methods are outlined here.

**M**ANY forms of inspection equipment for the modern factory were exhibited recently at the Hotel Astor, New York. The occasion was the first annual convention of the American Society of Mechanical Inspectors, an organization founded to extend the use of accurate measuring and testing instruments and to encourage the application of the best methods for the inspection of factory products.

The exhibitors included the following:—The United States Bureau of Standards; The American Society of Mechanical Inspectors; William Brewster, Inc.; Coats Machine Tool Co., Inc.; The College of the City of New York; Greenfield Tap and Die Corporation; Holz & Co., Inc.; Inspection Engineering Equipment Co.; C. E. Johansson, Inc.; Arthur Knapp Engineering Corp.; New York Testing Laboratories; Shore Instrument & Manufacturing Co.; Pratt & Whitney Co.; The Inspector Publisher Co.; The Industrial Press Publishing Co.; Wilton Tool & Mfg. Co.; West & Dodge Mfg. Co., and Jones & Lamson Machine Co.

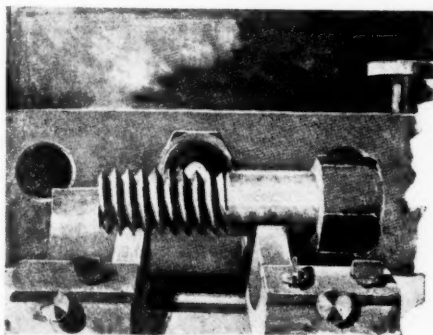
The optical method of testing bolt threads by throwing them upon a screen attracted much attention. For this test, a Hartness screw thread comparator was used, comprising a suitable lantern, a work holder, and the necessary lenses, all mounted on a substantial column. A short distance in front of the lantern was a tolerance chart on which was projected the thread shadow. Complete darkness is not necessary, or desirable, for such purposes, and a moderately lighted room was used. This display was made by the Jones & Lamson Machine Co., who em-

ploy the method in their machine shop and also manufacture the apparatus.

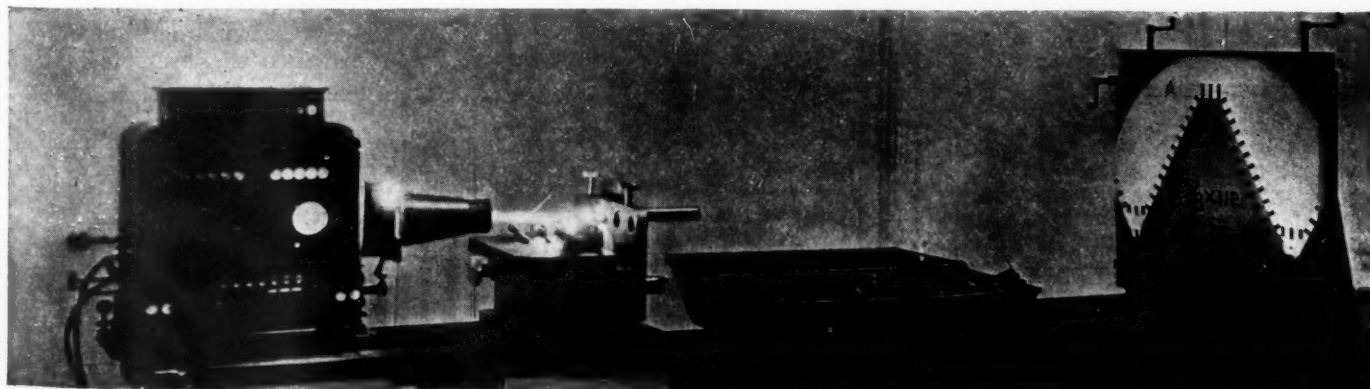
In tests of this nature an image of a plug or bolt with a standard thread is first thrown upon the screen and brought into position on the tolerance chart that is a large profile of the thread with the limiting values dotted in to scale. A useful size of chart is one about 200 times that of the bolt, if a small one, and the image is adjusted accordingly. When the standard plug has been removed, the bolt to be tested is inserted in the same position and the shadow examined to see if it falls within the tolerances. This examination requires but a glance, as a rule, to learn the entire story of the workshop.

To hold the master plug or the tested bolt in position, a nest of a few threads is used, and is placed a little to one side of the position occupied by the thread thrown upon the screen. The position of this nest is chosen arbitrarily, but the distance off center is usually about the thickness of the nut. If the lead of the tested bolt is not correct, the shadow will appear outside of the tolerances on the chart. Both the lead and the dimensions of the thread are thus readily determined by the enlarged image.

One of the manufacturers present stated that he uses the method in testing the run of bolts turned out in his shop, several tests being made during the day. This gives a true indication of what the machines are doing and prevents the scrapping of large numbers of bolts. If a machine is not running true, the error is detected before extensive waste occurs.

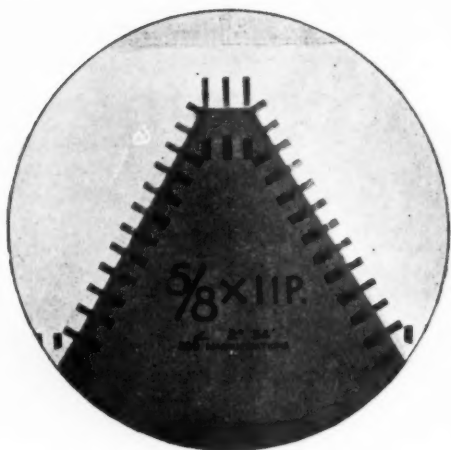


*Lenses project first standard, then bolt threads*

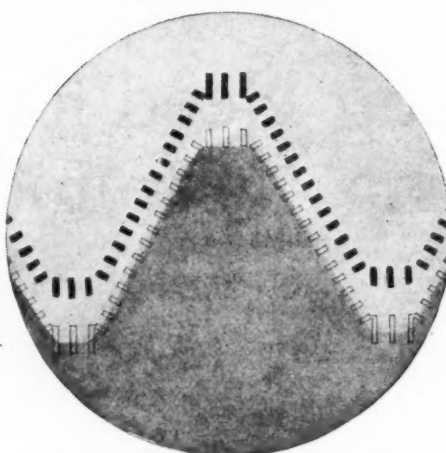


*The Hartness screw thread comparator in use*

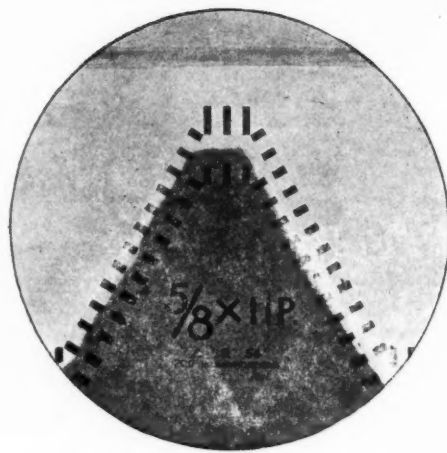




*Standard plug gage shadow on tolerance chart*



*Undersized bolt thread shadow falling outside tolerances*



*Thread shadow falling to left shows error in lead*

Various other methods were demonstrated for thread testing and verification of gages. Manufacturers present agreed that some accurate system of bolt testing should be in use, not only in bolt factories, but also in other machine shops where accurate and durable work was important. Checking up dies as well as bolts was regarded as necessary, also when reliable nuts and bolts were an important factor. Thread lead testers were exhibited by West & Dodge, together with other special gage equipments. The complete line of Pratt & Whitney thread gages were shown, in addition to snap gages, cylindrical and tapered gages. Mechanical inspection apparatus and laboratory equipment were shown by the Inspection Engineering Co. of New York. Representatives of the Arthur Knapp Engineering Corp., which manufactured considerable inspection equipment for the U. S. Bureau of Standards, strongly voiced the general sentiment for increased inspection.

Emphasizing the necessity of properly marking gages and tools, the Wm. Brewster Co., Inc., featured their improved Etchograph. The tool or other metal object to be marked is laid on one terminal of the electrical apparatus used for the purpose, while the other terminal is manipulated in much the same way as a pen or a pencil to do the marking. The machine can be readily connected to any 110-volt or 220-volt, 60-cycle, single-phase circuit, while special machines are arranged for connection to other circuits. As the power is utilized only while etching, comparatively little current is required. The only wearing part is the point or pencil, and it may be replaced with ordinary copper wire.

How broad the field of inspection is becoming and what remarkable progress is being made in methods and apparatus, would not occur to the average person who has not seen assembled in one place the varied assortment of instruments used for the purpose. There is room here for detailed descriptions of only the most striking of the instruments of the newer types, with a mere reference to some of the improvements in the older forms. So important is the field becoming that the prediction is made that colleges in future will confer the degree of Inspector Engineer.

Other apparatus which attracted attention, besides that already mentioned, included convenient types of sine bars for measuring angles direct, practically without calcula-

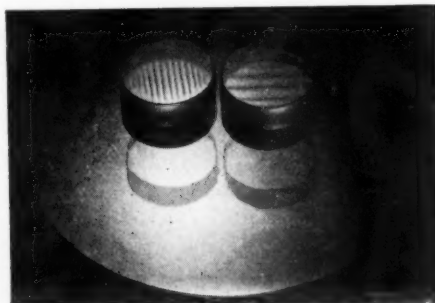
tion. Complete gaging products were demonstrated by the Greenfield Tap & Die Corp., and comprised spline gages, thread and limit gages and special fixtures. The exhibit of the Coats Machine Tool Co. included the improved Prestometer and the latest accessories. The pyroscope, featured by the Shore Instrument & Mfg. Co., attracted attention, as did also the scleroscope and methods for testing the hardness of metals. Portable Brinell meters and the standard Brinell machine were exhibited by Holz & Co. C. E. Johansson, Inc., exhibited gage blocks and measuring implements. The guiding hand of the U. S. Bureau of Standards was evident throughout the exhibition and the experts from that department did much in making clear the finer points of inspection problems. In a booth maintained by the American Society of Mechanical Inspectors, historical objects, statistics and inspection implements of various kinds were brought to the attention of those interested.

The method of making minute measurements by means of light interference was demonstrated by the Wilton Tool & Mfg. Co. and the Pratt & Whitney Co., in connection with their display of gage blocks, and by the Bureau of Standards. The importance of the method, it was pointed out, lies not so much in the actual value of using the millionth part of an inch in the shop as in the provision of a delicate method of testing the flatness of surfaces and even of comparing the lengths of gages.

In the demonstration, a red light and flat glass disks were used, the latter being ground to a degree of accuracy represented by  $\frac{1}{4}$  to  $\frac{1}{2}$  of a wave length of light, or between 0.00001 and 0.000005 of an inch. In making the test for flatness, the glass is simply placed on the surface under examination, care being taken to insure good contact. Then the light bands are studied, the straight bands indicating a flat surface and the crooked bands an uneven surface. That is all the operator needs to know in making the test. The

mathematical theory of light need not be gone into, as that has been worked out previously. In practice, the method is simplicity itself. The demonstrators stated that, in their laboratories, young girls were applying the tests and developing great skill, "who wouldn't know wave lengths of light from a flock of robins."

By applying a slight pressure on one side of the disk, the distance apart of the bands may be varied. Points



*The straight interference bands indicate a flat surface in the light wave method of gage testing*





A set of Wilton master gage blocks

90 deg. apart should be pressed in this manner, by turns, to make the tests more thorough. This guards against the possibility of mistaking a cylindrical surface for a flat one, for the cylinder also shows straight bands if the glass

rests evenly upon it. The pressure also insures the existence of a wedge of air between the two surfaces, a condition necessary to the formation of the interference bands. If the two surfaces in contact could be perfectly flat and parallel, the bands would entirely disappear.

To compare the lengths of two measuring blocks which are approximately alike, simply lay them beside each other with the flat disk over them. The block that has the fewer interference bands is the longer, for the pitch of the wedge is less. Moreover, using the red light as explained, the difference in the number of bands is the amount in hundred-thousandths of an inch. If there is about half a band's difference, then the difference in length is about half of a hundred-thousandth, or five-millionths of an inch.

In the case of curved bands, denoting a curved surface, the amount of curvature can be estimated with great accuracy. When the glass is placed flat upon the surface, the number of curved bands is counted from the central spot to the edge, this being the number of hundred-thousandths of an inch by which the flatness of the surface is in error.

## Redesigned Garvin 12-Inch Cam Cutting Machine

**T**HE feature distinguishing this machine from previous designs is that the spindle is now horizontal instead of vertical, and this change has been accompanied by certain other desirable modifications as hereafter described.

The machine is designed for cutting either flat or cylindrical cams. For cutting flat cams the work is mounted on the end of the work arbor, toward the spindle, with a former at the outer end of the arbor. A worm gear drives the work arbor from a universal power feed shaft. Power is transmitted through spur gearing, giving three changes of feed for the flat cam cutting fixture only.

The arm containing the work arbor pivots on the forward end, and is held at the rear end in guides, all mounted on the same table. To keep the former-pin against the former, offsetting the pressure of the cutter, the arm is provided with a number of detachable weights. These weights can be added to either end of the arm, and are made so as to release the pressure when cutting steep angled cams.

The illustration herewith shows the machine arranged for cutting cylindrical cams. In changing from the flat cam fixture to the cylindrical fixture, a slide bolted to the saddle of the machine is taken off and laid aside. The power feed universal joint shaft readily detaches for this purpose and attaches to the cylindrical fixture.

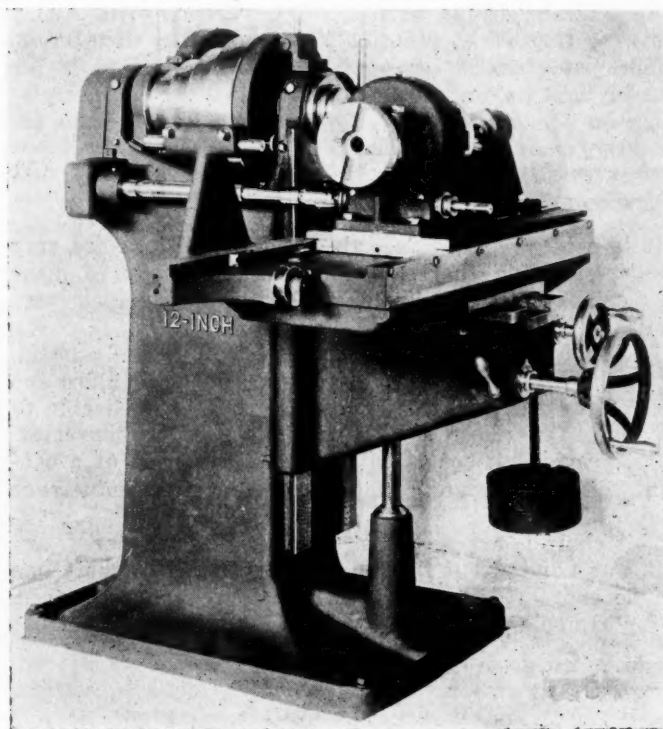
In operation, the feed rotates the work on the work arbor, the work being mounted on the far side of the fixture and the former on the other end of the work arbor.

The former-pin, shown in the front of the machine, is kept against the former by weights.

The movement of the cylindrical fixture is said to be very sensitive, as it works on large balls in a V shaped, tool steel track. The feed of both attachments can be disconnected by clutch, giving hand feed control by wrench. This is said to be very handy in setting up for cams that are cored, as well as for helping over steep angles.

The worm shaft is provided with a square end to receive the crank. The spindle of the machine is of Garvin standard milling machine construction. All gearing is

housed. There are two changes of feed provided on the machine when using the fixture for cutting cylindrical cams.



Garvin cam cutting machine

**T**HE City of Canton, China, has a motor population of fourteen passenger cars and ten motorcycles, according to reports in *The Oriental Motor* of Shanghai. A new forty-mile highway in the Hounghshan district, serviceable for motor traffic, will be opened within a few months, the journal adds.

# Energy Distribution Chart for Coils

Mr. Geist simplifies equations shown in a previous article. He presents a chart which offers a simple method of analyzing the energy performance of coils regardless of the proportion of their characteristics.

By Harry F. Geist, E.E.

IN an article entitled Energization of the Ignition Coil, published in AUTOMOTIVE INDUSTRIES, Vol. XLI, page 824, the writer presented three equations (10), (11) and (12) for theoretically determining the amount of energy expended by the supply source, the amount of energy loss due to resistance of the circuit and the amount of energy stored in the coil respectively for any period of closed circuit.

These three equations are as follows:

$$W = \frac{E^2 t}{R} \left[ 1 - e^{-\left(\frac{Rt}{L}\right)} \right] \quad (1)$$

$$W_r = \frac{E^2 t}{R} \left[ 1 - e^{-\left(\frac{Rt}{L}\right)} \right] + \frac{2E^2 L}{R^2} \left[ 1 - e^{-\left(\frac{2Rt}{L}\right)} \right] \quad (2)$$

$$W_s = \frac{E^2 L}{2R^2} \left( 1 - 2e^{-\left(\frac{Rt}{L}\right)} + e^{-\left(\frac{2Rt}{L}\right)} \right) \quad (3)$$

It is evident at a glance that these equations are very cumbersome and therefore very unsatisfactory to make calculations from. A simpler method would be much more desirable.

To attain this purpose, the writer has developed a chart, shown in Fig. 1 herewith, which not only simplifies the calculations for any particular case, but is applicable to any coil, regardless of the proportions of its characteristics, provided it comes within the assumption of a constant voltage, constant resistance and constant inductance values.

This chart is arrived at in the following manner.

It was pointed out in the article referred to that time can be expressed in terms of inductance and resistance, as for example

$$t = \frac{L}{R}, \frac{2L}{R}, \frac{3L}{R}, \text{ etc.}$$

From this fact it is found that by substituting various values of time in the above equations (1), (2) and (3), they all take the same general form

$$W = K \frac{E^2 L}{R^2} \quad (4)$$

in which the value of the constant  $K$  depends upon the expression for time used and the particular equation from which it is derived. This common expression for all three equations suggests a simple chart.

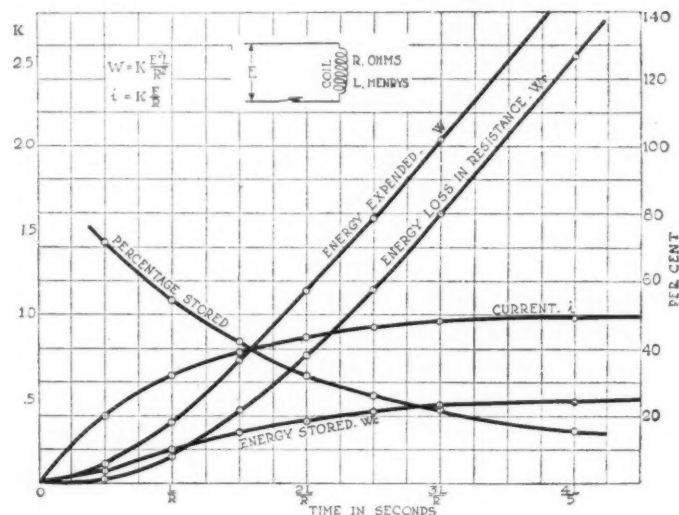


Fig. 1—Energy distribution chart for coils of constant  $E$ ,  $L$  and  $R$

The values

$$t = \frac{0.5L}{R}, \frac{L}{R}, \frac{1.5L}{R}, \frac{2L}{R}, \frac{2.5L}{R}, \frac{3L}{R}$$

and  $\frac{4L}{R}$  were substituted in each of the equations and the resulting values of  $K$  in each case was plotted against time in its inductance and resistance proportionality form, giving the three curves shown in the chart. The "energy expended" curve was derived from equation (1), the "energy loss in resistance" curve was derived from equation (2) and the "energy stored" curve from equation (3).

Along with these curves a fourth curve shows the percentage of the energy stored for the different periods.

It is comparatively a simple matter to determine from this chart the amount of energy expended in a coil for any given period of time following the closing of the circuit, as well as the manner in which it is distributed.

## EXAMPLE

As an example, assume an ignition coil whose primary has a co-efficient of self-induction of 0.012 henrys. Assume that the coil is to operate on a 6-volt battery and that the combined coil and battery resistance is found to be 2.0 ohms, and also that the timer mechanism is designed to hold the circuit closed at normal engine speed for 0.015 second. Determine the amount of energy expended by the battery.

First, it is necessary to reduce 0.015 second to terms of inductance and resistance. This is done as follows:

$$t = \frac{XL}{R} \quad (5)$$



from which by substituting the values of  $t$ ,  $L$ , and  $R$ ,

$$X = \frac{0.015 \times 2}{0.012} = 2.5$$

and therefore

$$t = 2.5 \frac{L}{R}$$

represents the equivalent of 0.015 second in terms of the inductance and resistance factors.

Referring to the chart, it will be found that the value of  $K$  on the "energy expended" curve corresponding to  $t = 2.5 L/R$  is about 1.58. Now by substituting the values  $K = 1.58$ ,  $E = 6$ ,  $L = 0.012$ , and  $R = 2$ , in equation (4), the energy expended is found to be

$$W = \frac{1.58 \times (6)^2 \times 0.012}{(2)^2} = 1.58 \times 0.108 = 0.171 \text{ joule}$$

giving the amount of energy expended for the period 0.015 second.

The percentage curve shows that 26.5 per cent of this amount is stored in the circuit available for the spark, or

$$W_c = 0.0454 \text{ joule,}$$

leaving the balance

$$W_r = 0.1256 \text{ joule}$$

representing the loss due to the resistance. The values  $W_c$  and  $W_r$  can also be determined from the value of  $K$  and equation (4) in the same manner that  $W$  was found.

It is evident from the above example that this chart offers a very simple method of analyzing the energy performance of coils.

In coils having an iron core, the inductance undergoes some change with the increased density of magnetization, so that the chart does not hold strictly true, but will agree as closely with the actual phenomena as the results shown in Fig. 3 of the article referred to. For coils without iron cores the actual and theoretical phenomena will be practically the same.

## Spark Plug Tests for Motor Transport Corps

**S**PECIFICATIONS of tests that must be undergone by spark plugs to be sold the Motor Transport Corps of the American Army have recently been approved and adopted as standard, and any commercial plug purchased for army use must meet the requirements to be placed upon the approved list. The specifications follow:

### I. GENERAL

(a) This specification covers the type of spark plugs used in engines of motor trucks and passenger cars.

(b) Plugs shall preferably be two-piece construction. Plugs with other than conventional shaped spark point terminals must be submitted to the Motor Transport Corps for approval of each type.

(c) To be approved for purchase a type of spark plug must conform to the specifications and tests described below; and must also have been found to give satisfactory service for at least 100 hours total running time on road or dynamometer test, at the discretion of the Motor Transport Corps and on an engine of a type to be specified by the Motor Transport Corps. The running test shall include (1) idling, (2) light load, (3) average load, (4) full load.

(d) Test of spark plugs shall be conducted at the option of the Motor Transport Corps.

(e) The laboratory tests shall be made either at the Bureau of Standards, Washington, D. C., or by any other recognized authority to be designated by the Motor Transport Corps.

(f) The tests described below shall be made on each new type of spark plug submitted for approval, and also on plugs of approved types at such other times as may be desired by the Motor Transport Corps, in order to insure the maintenance of the quality of the plugs delivered. In either case, ten (10) plugs shall be submitted for engine tests, and ten (10) plugs and ten (10) insulators without shells or electrodes for laboratory tests.

(g) In cases where the plugs contain types of insulator which have been already approved, the tests on the bare insulator may be waived at the discretion of the Motor Transport Corps.

### II. CONSTRUCTION AND DIMENSIONS

(a) The threaded portion of the plug shall conform to the S. A. E. standard dimensions for  $\frac{7}{8}$ -in. and metric spark plug threads, and of the A. S. M. E. for  $\frac{1}{2}$ -in pipe thread, to within their respective tolerances.

(b) The gap between the electrodes shall be between

0.5 mm. and 0.7 mm. (0.020 in. and 0.028 in.) and the design and construction shall be such as, in the judgment of the inspector, to maintain this spacing under all conditions of use.

(c) Terminals with 8-32 threads shall be of the screw and nut construction, and the nut shall be adapted to take either eyelet or split spade terminal.

### III. TESTS

(a) Dielectric Strength. Three of the sample insulators shall withstand for two minutes without puncture an effective alternating voltage of 25,000 volts applied between the central electrode and a metal band around the outside of the insulator. This test is to be made while the insulator is immersed in oil at room temperature. The passage of a spark over the surface of the insulator shall not be counted a failure unless it occurs at less than 20,000 volts.

(b) Resistance to Mechanical Vibration. Two of the assembled plugs shall be tested in the manner described below and shall show no cracks or other signs of mechanical damage after 25,000 blows. The plugs are screwed firmly into the side of a steel block 6 x 6 x 9 cm. (2.36 in. x 2.36 in. x 3.54 in.) which is carried on the end of an arm 24 cm. (9.44 in.) long. By means of a pair of cams the block is raised 19 mm. (.74 in.) and allowed to fall upon a hardened steel rail. A pair of tension springs assist in pulling the block downward and give it a velocity of about 200 cm. (78.74 in.) per sec. at the instant of impact.

(c) Resistance to Thermal Cracking. Five insulators with shell and central electric removed shall be brought to a uniform temperature of 150 deg. Cent. and then quenched in water at room temperature and examined for cracks by soaking for several hours in an alcoholic solution of eosin.

After the aforesaid quenching and soaking no cracks shall be visible to the naked eye. This test shall not apply to mica plugs.

(d) Gas Tightness. Six of the completed plugs shall be screwed into a pressure bomb containing air at a pressure of 15 kg. per sq. cm. (225 lb. per sq. in.) and immersed in a bath of oil heated to 150 deg. Cent. Under these conditions the average volume of air leaking through the plugs shall not exceed 1 cc. (.06 cu. in.) per sec., and that through the worst plug shall not exceed 2 cc. (.12 cu. in.) per sec. This test shall be made both before and after the engine test.



# The Design of Pneumatic Tired Trucks

## PART II

Continuing the article begun last week, Mr. McCreery sets forth his ideas on the construction necessary for heavy trucks equipped with pneumatics. He gives here some interesting results obtained from experiments in constructing a truck with six wheels. This instalment ends the series.

By C. M. McCreery\*

THESE are now in satisfactory service wood wheels, 8 or 10 designs of cast-steel wheels and disk wheels. On all of these can be mounted either the so-called demountable type of rim or the so-called detachable rim. (See Figs. 2 and 3.)

The arguments for the demountable rim are the inflated spare tire and the short time required for a tire change. Against the demountable are the extra weight required, the extra cost and the possibility of mechanical troubles. The detachable rim arguments are the exact opposite. In its favor are less weight and cost and a greater freedom from mechanical troubles. Against it are the arguments of time required for a tire change and means of inflating the tire after it is changed.

Tubes for pneumatic truck tires must be designed and compounded so as to retain as much of their original strength and shape as possible, after being subjected in service to more or less heat and to continued flexing.

Flaps assume considerable importance in tires inflated to the recommended pressures. It is important that the flap fit well, so that there will be no adjustment when the tire is inflated, causing a localized stretch in the tube at the edge of the flap.

The valve question had to be approached from two angles; first, from the standpoint of holding air at pressures from 90 to 140 lb. and second, from the standpoint of ease of tire change. The valve-insides on all tubes 6 in. and larger are of a heavy-duty type, different from the ordinary valve-insides in construction, but the two are interchangeable in any valve stem (See Fig. 5). On the 10 and 12-in. sizes, which are inflated to 130 and 140 lb. per sq. in. respectively, even the heavy-duty type is at present unsatisfactory when used alone, so a combination is used in the form of a heavy-duty valve-inside and a needle valve operated by a hand-screw.

\*Highway Transportation Division, Development Department, Goodyear Tire & Rubber Co.

Paper read at the truck and tractor meeting of the Society of Automotive Engineers at Chicago, Jan. 28—condensed.

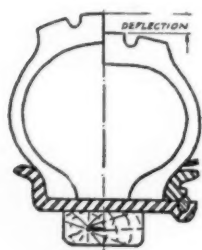


Fig. 1

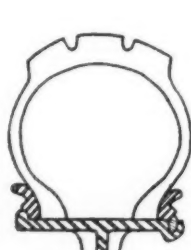


Fig. 2

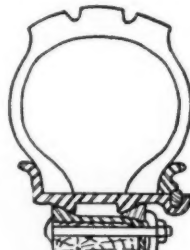


Fig. 3

Another important item is the arrangement of tires on the trucks. There are three possibilities: (a) the conventional truck with single pneumatic tires on four wheels, (b) dual pneumatics on the rear, and (c) trucks with six or more wheels.

The dual idea was tried and abandoned several years ago, but it crops up now and I want to set the reasons for dropping it clearly before you. The dual tires do not share the load equally, because the inflation is seldom kept

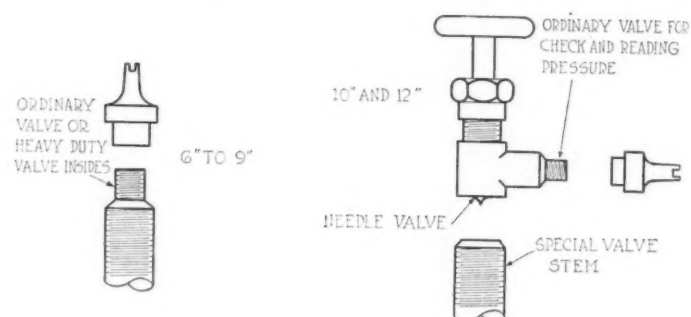


Fig. 5

alike in both tires and because on crowned roads, and more particularly rough roads, one tire takes more than its share of the load. Dual tires are too easily abused and prove more expensive than either of the other two possibilities.

The company came to realize some time ago that the introduction of the pneumatic tire for motor trucks would have a material bearing upon the design of the truck itself to get the most good from the use of such a tire. For this reason we have been making a study of the problem, and have at this time certain considerations to present.

Table VII shows road speeds that I consider satisfactory, together with the usual rear-tire specifications for various sizes of truck. The engine speeds are figured on the basis of 1200 ft. per min. piston speed, which value I believe can be considered a good average. However, some

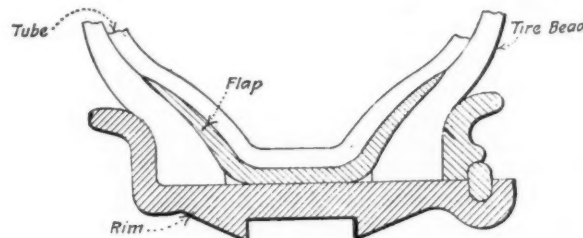


Fig. 4

TABLE VII

| Present Solid Tire Gear Ratios | Solid Tire, Average Governed Speed, m.p.h. | Truck Capacity, tons | Recommended Speed for Pneumatic-Tired Truck, m.p.h. | Rear Tire Size, in. | Speeds             |                | Pneumatic-Tired Truck Rear Axle Gear Reduction |
|--------------------------------|--|----------------------|---|---------------------|--------------------|----------------|--|
|                                |  |                      |   |                     | Rear Wheel, r.p.m. | Engine, r.p.m. |  |
| 7                              | 17   | 1                    | 30  | 36                  | 280.0              | 1,450          | 5.18   |
| 8                              | 17   | 1½                   | 30  | 38                  | 265.4              | 1,450          | 5.18   |
| 9                              | 15   | 2                    | 30  | 40                  | 252.1              | 1,325          | 5.52   |
| 10                             | 15   | 2½                   | 30  | 42                  | 240.1              | 1,325          | 5.26   |
| 11 to 12                       | 13   | 3½                   | 25  | 44                  | 191.0              |                | 6.28   |
|                                |  |                      |   | 38                  | 221.1              | 1,200          | 5.43   |
| 12 to 13                       | 11   | 5                    | 25  | 48                  | 175.0              |                | 6.86   |
|                                |  |                      |   | 40                  | 210.1              | 1,200          | 5.72   |
| 14 to 16                       | 9  | 7                    | 20  | 42                  | 160.1              |                | 7.50   |
|                                |  |                      |   | 44                  | 152.8              | 1,200          | 7.85   |

\* 6-wheel combination.

engines on the market may not operate successfully at this speed and again others can stand a higher speed. Higher speeds set up considerable vibration and add discomfort to driving. In general it may be noted that solid-tire gear-reductions range from 7 to 16, whereas recommended ratios for pneumatic tires range from about 5 to 8.

Table VIII shows a study in computed speeds over a given course which corresponds somewhat to the course

having 100 per cent more capacity than is the case with solid-tired trucks. This raises the question of how to apply such a capacity easily. In answer to this I would suggest the application of brakes to the front wheels when all the capacity possible is attained in the rear. Front-wheel brakes are now well developed, due to the use during the war of trailers which required brakes on the steering axles.

When the normal speed has been determined, we may next consider the tractive ability required to get over the road without the inconvenience of shifting gears too often. The tractive factors that I consider desirable and satisfactory are shown in Table IX, figured according to the formula at the head of the table.

The engine torque required to give these tractive factors is also shown, together with the sizes of engines on the market to-day that develop the torque required. There are conditions, however, where larger engines may be desirable. I believe smaller engines will not give satisfactory speed. The striking difference between tractive factors for pneumatic-equipped trucks and solid-tired trucks can be accounted for by the fact that the former, when approaching a hill, has about four times the momentum of the latter and will carry itself over a large percentage of hills without increased power. However, with the increased power applied it will ascend a very long, steep grade before requiring a shift in gears.

The figures here recommended are based upon numerous trials of trucks of various capacities in our transportation. With the high-gear tractive ability and engine size determined, we have next the low-gear ability to consider. We find a tendency toward a low-gear ratio in the transmission of 6 to 1 in 5-ton trucks. This, in connection with present solid-tire axle-ratios, gives a tractive factor of 0.42. A desirable low-gear ability for trucks equipped with pneumatic tires may be given as 0.50; it should not be less than 0.30.

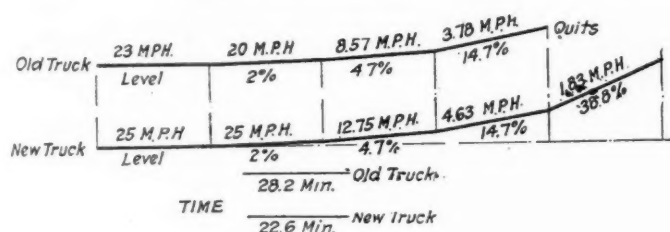


Fig. 6

from Akron to Cleveland, going by the way of Tallmadge in the one case, and by way of Akron's North Hill in the other. K-1 represents a "standard" make of truck in our transportation service. It will be noted that a normal speed of 25 m.p.h. is required to double the average speed of a solid-tired truck whose normal or governed speed is 11 m.p.h. The reason, of course, is that the solid-tired truck has a higher tractive ability in high gear, and hence is able to maintain its normal speed over a great many grades.

Fig. 6 shows how time can be conserved by a careful study of gear reductions. The saving on a course four miles long with grades as shown in the illustration amounts to 20 per cent.

On account of the higher speed of the pneumatic-equipped trucks, it is necessary to equip them with brakes

TABLE VIII

|                                | Solid Tire, 1260 r.p.m. |           | New Job, 1400 r.p.m. |           | Six-Wheel, 1600 r.p.m. |           | K-1, 1400 r.p.m. |           |
|--------------------------------|-------------------------|-----------|----------------------|-----------|------------------------|-----------|------------------|-----------|
|                                | Speed, m.p.h.           | Time, hr. | Speed, m.p.h.        | Time, hr. | Speed, m.p.h.          | Time, hr. | Speed, m.p.h.    | Time, hr. |
| TALLMADGE                      |                         |           |                      |           |                        |           |                  |           |
| 3 miles, 6 per cent grade..... | 6.66                    | 0.45      | 8.57                 | 0.35      | 6.25                   | 0.48      | 8.15             | 0.37      |
| 3 miles, 3 per cent grade..... | 11.00                   | 0.27      | 17.90                | 0.16      | 10.50                  | 0.29      | 14.10            | 0.21      |
| 34 miles, level .....          | 11.00                   | 3.09      | 25.00                | 1.36      | 25.00                  | 1.36      | 23.00            | 1.48      |
| Total time .....               |                         | 3.81      |                      | 1.87      |                        | 2.13      |                  | 2.06      |
| Average speed .....            | 10.50                   |           | 21.40                |           | 18.70                  |           | 19.40            |           |
| NORTH HILL                     |                         |           |                      |           |                        |           |                  |           |
| 1 mile, 12 per cent grade..... | 3.52                    | 0.28      | 4.63                 | 0.22      | 3.47                   | 0.29      | 3.78             | 0.26      |
| 2 miles, 6 per cent grade..... | 6.66                    | 0.30      | 8.57                 | 0.23      | 6.25                   | 0.32      | 8.15             | 0.25      |
| 3 miles, 3 per cent grade..... | 11.00                   | 0.27      | 17.90                | 0.16      | 10.50                  | 0.29      | 14.10            | 0.22      |
| 34 miles, level .....          | 11.00                   | 3.09      | 25.00                | 1.36      | 25.00                  | 1.36      | 23.00            | 1.48      |
| Total time .....               |                         | 3.94      |                      | 1.97      |                        | 2.26      |                  | 2.21      |
| Average speed .....            | 10.10                   |           | 20.30                |           | 17.70                  |           | 18.10            |           |



TABLE IX

Tractive Factor =  
Maximum Engine Torque in pound-inches  $\times$  Efficiency of Transmission (0.90 in high gear, 0.85 in other)  
 $\div$  Gear Reduction  $\div$  Weight of truck and load in pounds  $\times \frac{1}{2}$  the diameter of rear tire in inches

| Truck Capacity tons | Pneumatic Tire Tractive Factor | Corresponding Solid Tire Tractive Factor | Engine Torque, lb.-in. | Engine Sizes on Market that Develop Approximate Torque Required, in. |  |                                   |
|---------------------|--------------------------------|--|------------------------|--|--|-----------------------------------|
| 1                   | 0.07                           | 0.085                                    | 1,650                  | 3 $\frac{3}{4}$ x 5  | 4 x 5                                      | 3 $\frac{3}{4}$ x 5 $\frac{1}{2}$ |
| 1 $\frac{1}{2}$     | 0.06                           | 0.085                                    | 1,950                  | 4 x 5 $\frac{1}{2}$  | 4 $\frac{1}{8}$ x 5 $\frac{1}{4}$          | 4 $\frac{1}{8}$ x 5 $\frac{1}{2}$ |
| 2                   | 0.06                           | 0.083                                    | 2,500                  | 4 $\frac{1}{2}$ x 6  | 4 $\frac{1}{2}$ x 6 $\frac{1}{4}$          | 4 $\frac{1}{2}$ x 5 $\frac{1}{2}$ |
| 2 $\frac{1}{2}$     | 0.06                           | 0.082                                    | 3,000                  | 4 $\frac{3}{4}$ x 6  | 4 $\frac{1}{2}$ x 6 $\frac{1}{4}$          |                                   |
| 3 $\frac{1}{2}$     | 0.05                           | 0.077                                    | 3,000                  | 4 $\frac{3}{4}$ x 6  | 4 $\frac{1}{2}$ x 6 $\frac{1}{4}$          |                                   |
| 5                   | 0.04                           | 0.070                                    | 3,200                  | 5 x 6  | 4 $\frac{3}{4}$ x 5 $\frac{1}{2}$ (6 cyl.) |                                   |
| 7                   | 0.04                           | 0.060                                    | 3,300                  | 5 x 6  | 4 $\frac{3}{4}$ x 5 $\frac{1}{2}$ (6 cyl.) |                                   |

Table X shows the low-gear transmission ratios necessary to give these tractive factors. It will be observed that these ratios are considerably different from present practice. The question naturally arises, how can this best be handled?

A conventional design of transmission to give about 14 to 1 reduction in low gear is so bulky that it cannot well be considered. The next best and easiest arrangement is as shown in Fig. 7, where we have a three-speed unit transmission of regular design in combination with an auxiliary transmission having 3 $\frac{1}{2}$  to 1 reduction

TABLE X—TRANSMISSION LOW-GEAR REDUCTION

| Truck Capacity, tons | Low Gear Tractive Factor | Engine Torque, lb.-in. | Total Gear Reduction | Rear Axle Reduction | Trans-mission Reduction in Low Gear Factor | Trans. Dedn. 0.30 Tractive Factor |
|----------------------|--------------------------|------------------------|----------------------|---------------------|--|-----------------------------------|
| 1                    | 0.50                     | 1,650                  | 49.1                 | 5.18                | 9.47                                       | 5.68                              |
| 1 $\frac{1}{2}$      | 0.50                     | 1,950                  | 51.0                 | 5.47                | 9.32                                       | 5.58                              |
| 2                    | 0.50                     | 2,500                  | 49.5                 | 5.26                | 9.42                                       | 5.64                              |
| 2 $\frac{1}{2}$      | 0.50                     | 3,000                  | 51.7                 | 5.52                | 9.37                                       | 5.62                              |
| 3 $\frac{1}{2}$      | 0.50                     | 3,000                  | 61.4                 | 5.43                | 11.30                                      | 6.77                              |
| 5                    | 0.50                     | 3,200                  | 79.7                 | 5.72                | 14.00                                      | 8.40                              |
| 7                    | 0.50                     | 3,300                  | 105.0                | 7.50                | 14.00                                      | 8.40                              |

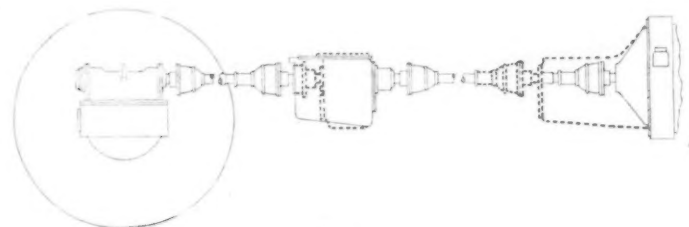


Fig. 7

which, combined with the 4 to 1 low-gear reduction in the unit set, gives 14 to 1 total transmission low-gear reduction. Dotted lines in the figure show the unit and auxiliary, whereas the light full lines represent the standard amidships construction. A compact gearset system involves the combination into one of the two sets above mentioned.

Any fixing of allowable stress requires an investigation of the cushioning effect of pneumatic, as compared with solid, tires.

Fig. 8 shows the rate of deflection of the pneumatic tires and their corresponding solid tires, together with a curve showing how the solid tire loses resilience with age and wear. It will be seen here that for a given load the pneumatic tire deflects four times as much as a solid tire.

On this basis, it is apparent that the stresses in unsprung parts due to shock, build up to the same amount whether pneumatic or solid tires are used. There is, however, a difference in the time element; that is, the time required to build up the stress due to shock is twice that of the solid tire, in the case of pneumatic tires. If any reduction of the factor of safety is justifiable, it

appears that it is to be done on this basis. As yet we have been unable to conceive a method of testing or experimenting that will prove conclusively how much the factor of safety can be changed because of this time element. Any suggestions along this line will be appreciated. I have, however, taken a 2-ton chassis and installed engines designed for 3-ton trucks, and made the trucks haul 3 $\frac{1}{2}$  tons of freight very successfully. From numerous other trials like this I conclude that if a factor of safety of 6 is safe with solid tires, a factor of 5 can be allowed for pneumatic equipment. This refers mainly to unsprung parts. Regarding sprung parts, it is difficult even to estimate the allowable stresses. It appears that the factor of safety can be reduced, but not so much as in the case of unsprung parts. For instance, with pneumatic tires, the frame is not deteriorated by shocks in the same manner as when solid tires are used, the rivets stay tight, etc.

The method of carrying spare tires is quite a problem. However, it is worth while to make provision for carrying this spare equipment when designing the body or chassis. Probably the best solution is to place a compartment directly back of the driver's seat, so that the tire can be removed and replaced without disturbing the pay load. The next best place is under the chassis frame at the rear and at the side opposite the muffler.

A power-driven tire pump is indispensable when pneumatic tires are used for the main reason that the truck cannot be moved any distance on a deflated tire without causing serious damage. Even though the truck is equipped with demountable rims and inflated spare tires are carried, there will be times when a single use of the air pump will be worth the cost of the pump. Having the tire pump installed on the truck will facilitate keeping the tires properly inflated and produce better tire

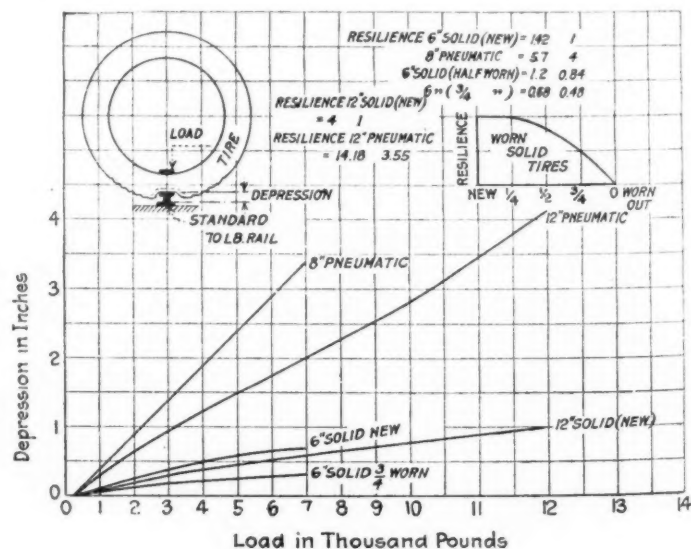


Fig. 8

mileage; this factor alone will easily overcome the cost of the tire pump and in addition yield good returns. This pump should be designed to drive from the transmission. At least this is preferable; a pump mounted on the engine adds to the congestion under the hood, and the small shaft available, already carrying the water pump and magneto, is not strong enough for an air pump. The pump can best be air-cooled, due to its intermittent service and the difficulty of embodying any efficient water-cooling arrangement without much expense. Also, its lubrication should be well worked out, with a view toward avoiding any oil discharge that would injure the inner tube. The speed at which the pump is to operate should not exceed one-half of the governed engine speed and in no case should it be over 600 r.p.m. The pump should operate to permit complete inflation of a 10-in. tire in approximately 10 min. This figure is being realized by several pumps now on the market.

It is worthy of note that a 44 x 10 in. tire contains 5700 cu. in. of air space. The area of the orifice through which the air must pass in a standard tire valve is

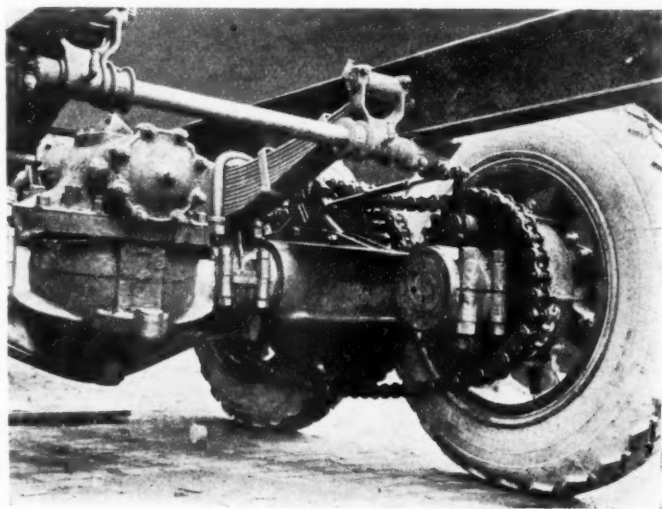


Fig. 9

0.00307 sq. in. Hence, if a pressure of 200 lb. per sq. in. upon this orifice is assumed, the minimum time of inflation of a 44 x 10 in. tire would be about 6 min.

It is debatable whether a two-stage pump is necessary in this service. Certainly, present design would not indicate this to be true, as there are single-stage pumps quite as efficient as any two-stage for this relatively small volume. It is suggested that the air intake on the pumps be piped to a clean point on the truck, perhaps under the seat, thus preventing dirt from being sucked into working parts. At least 6 ft. of copper tubing should be placed between the pump and the hose, to avoid burning off the latter. The advisability of placing a small receiving chamber in the line has been suggested. This would equalize the air pressure and assist in reducing the excessive temperature of the air delivered.

It may interest you to know that my company has under construction at present two 5-ton trucks of six-wheel design. These trucks have the following specifications:

Engine, 5 x 6 in.; four-cylinder.

Transmission, unit power plant and auxiliary; 14 to 1 low-gear reduction.

Rear axle, Goodyear tandem rear. Made up of two worm-drive axles, intended for use on 1½-ton solid-tire trucks in one case, and two internal-gear axles of the same rated size in the other. The rear-axle gear-reduction is 5.8 to 1.

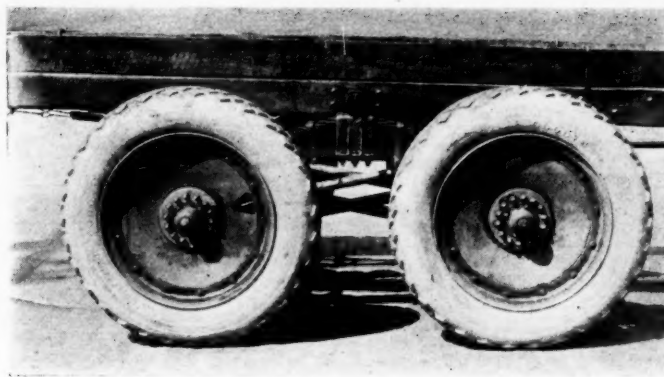


Fig. 10

Front axle, intended for a 3½-ton solid-tire truck.

Frame, 3 x 7 x ¼ in., pressed steel.

Tires, 40 x 8 in., pneumatic; six in all.

On account of the large size and weight of the 48 x 12 in. pneumatic tire for the 5-ton trucks, it was necessary to consider the application of four tires to the rear of the truck, instead of having two of the excessively large ones. The first attempt at an arrangement for applying four small tires to the rear, without using dual tires, which is considered out of the question, is shown in Fig. 9. This consisted of a more or less standard rear axle with a walking-beam adapted to each end and with the wheels mounted upon trunnions from this walking-beam, the springs being mounted upon the axle and attached to the frame on the inside. A chain drive, which, by the way, is about the only feasible drive with this arrangement, was used. This construction ran successfully for about 10,000 miles before a serious failure occurred. Some inconvenience was caused by having the chains jump off and inability to get a brake mechanism that would work. The main point against this design is its enormous weight; however, it served to show that satisfactory tire mileage could be secured from such an arrangement and that there was a good possibility of adapting four relatively small tires to the rear wheel. To develop further this point, the tandem-axle construction, shown in Figs. 10 and 11, was built up. This construction appears to have good possibilities and has at present operated about 3300 miles, 1000 to 1200 miles of which has been on an entirely rough and uneven country road, so rough in fact that it was difficult to keep the front spring tight. The principle of

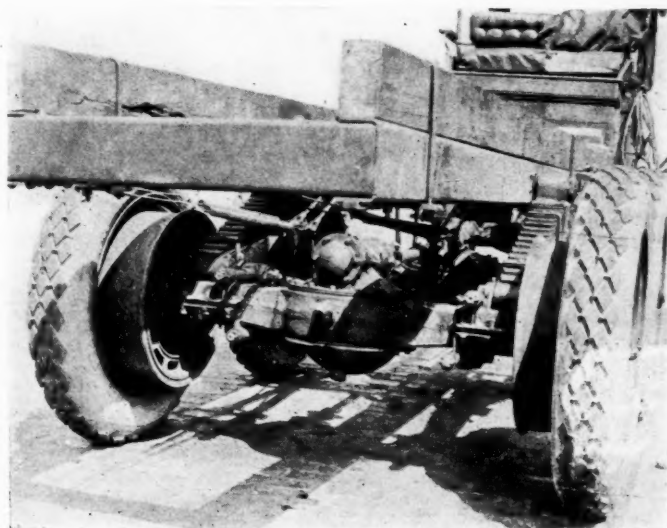


Fig. 11



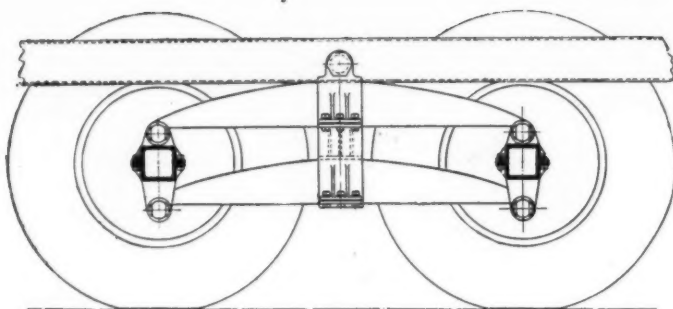


Fig. 12

construction can easily be seen by referring to the illustration. It consists of two small live-axles, with inverted springs pivoted at the center upon the frame and with the ends resting upon the axles. The axles are tied together by crossed torque-rods. The drive is passed through the forward to the rear axle by a short propeller-shaft.

Fig. 12 indicates the possibility of using four springs to tie the axles together and is a very feasible construction to use in connection with the tandem rear-drive. While the drive described here is worked out for a truck of 5-tons capacity, it is equally applicable to one of 7-tons capacity. Some of the advantages the six-wheel truck has over the regular type of the same capacity, on 48 x 12 in. pneumatic tires are:

- (1) Saving in cost.
- (2) Reduction in weight.
- (3) Reduction in axle cost.
- (4) Increased traction.
- (5) Better riding qualities.
- (6) Less damage to roads.
- (7) Larger brakes.
- (8) Greater operating radius.

Compared to the pneumatic-tired four-wheel-truck using tires of large diameter, namely 48 x 12 in., the saving by using four smaller tires is about \$500; sufficient to purchase three or four complete spares.

Each 40 x 8 in. tire weighs only 119 lb., whereas each 48 x 12 in. tire weighs 398 lb. Carrying a spare tire in each case, the total weight reduction in tires alone amounts to over 500 lb. in favor of the 8-in. size. Then again, the 8-in. spare can also be used as a front-wheel spare; this reduces the tire investment still further.

The use of two rear axles in tandem results in the employment of small axles which are in large production with consequent lower costs, instead of the large sizes that are made only in small quantities with relatively high costs. The actual saving amounts to about \$120 per truck. This means that the tandem rear-drive mechanism costs somewhat less than standard two-wheel rear-drive for heavy trucks.

TABLE XI

|  | Lb.   |
|--|-------|
| Weight of 5-ton truck axle, exclusive of brake-drum.....             | 1,660 |
| Weight of two 1½-ton solid tire axles, exclusive of brake-drum ..... | 1,200 |
| Saving in axle weight .....  | 460   |
| Saving in weight of tires .....                                      | 520   |
| Total saving .....   | 980   |
| Less excess wheel and brake-drum weights .....                       | 77    |
| Net saving in weight due to use of 8-in. tires .....                 | 903   |
| Saving in weight of radius-rods, springs, etc. ....                  | 300   |
| Net total saving in weight .....                                     | 1,203 |

While four 8-in. wheels with the brake-drums, etc., weigh 77 lb. more than the same truck equipment for

12-in. tires, there is a saving in weight of 1203 lb. per truck. The details of this reduction are given in Table XI.

As compared with a solid-tired truck of equal weight capacity, we have the savings given in Table XII.

TABLE XII

|  | Lb.   |
|--|-------|
| Weight of two 48x12-in. solid tires and wheels .....     | 1,262 |
| Weight of four 40x8-in. pneumatic tires and wheels ..... | 1,208 |
| Excess weight of solid-tire equipment .....              | 54    |
| Saving in weight of axle .....                           | 460   |
| Saving in weight of springs, radius-rods, etc. ....      | 300   |
| Total saving over solid tires .....                      | 814   |

The area of contact of four 8-in. pneumatic tires upon the road is about 27 per cent greater than two 12-in. pneumatics. This additional surface keeps the tires from sinking in soft places, gives better traction under conditions when most needed and in ordinary service the additional area gives better traction. As compared to solid tires in winter service, off of paved roads, etc., the four pneumatic tires have all of the advantage.

The tandem rear drive has about the same advantageous effects over single-axle construction that the pneumatic would have over solid tires. With the tandem combination, when passing over an obstruction in the road the chassis is raised only one-half the distance it would be in the regular type of construction. This reduces the acceleration of bodies upon the chassis to one-fourth that with ordinary construction. Thus, by reducing shocks and vibration, the number and cost of repairs due to fatigue of metal, etc., are reduced by a large percentage.

The tandem construction makes for such exceptional riding qualities that a glass filled with water to within 1 in. of the top, attached to the rear of the six-wheel truck, lost none of its contents even when operated over a decidedly rough and rocky road.

The most destructive factors of the operation of vehicles upon pavements are the wheel-load and the wheel-thrust. Therefore, if one of two tires under the rear end of a standard 5-ton truck bears down upon the road with a pressure of 8000 lb., it will find a great many places where the road will allow it to crush through and once the break is accomplished a rut or chuck hole is started. However, if this single tire is replaced by two that are separated a considerable distance, the pressure of each of the smaller tires becomes 4000 lb. upon the pavement instead of 8000 lb. and a place in the road that will break through is seldom found.

This tandem rear-drive cuts in two the heavy wheel-loads and the thrust as well, thereby making it possible to design pavements suitable for 3½-ton trucks, and carry 5 and 7-ton loads upon them with no increase in their destruction.

The tandem-axle combination has a decided advantage over both the regular pneumatic and solid-tired types in that four brakes of 21-in. diameter are available in place of two brakes of 21-in. diameter, the maximum possible with the two-wheel rear-drive type.

Pneumatic tires permit of doubling the average speed, and the tandem rear-drive will permit increased minimum speeds on bad roads, rough streets, etc.

The design of the ultimate motor truck to use pneumatic tires will in general require the following changes over present solid-tire design:

- (1) Considerably higher rear-axle gear-reductions, ranging from 5 to 8 for pneumatics as against 7 to 16 for solid tires.
- (2) About 15 per cent increase in engine sizes.

- (3) Lower transmission low-gear reductions, ranging from 9 to 14 for pneumatic as against present solid-tire practice of  $3\frac{1}{3}$  to 6. This will automatically introduce a fifth speed, which will account for better average road speed.
- (4) Lighter unsprung parts such as front and rear axles and wheels.
- (5) Multiple-wheel construction to accommodate the heavier tonnage, securing the advantages of pneumatic-tire equipment.

## Method of Determining Magneto Primary Current at Break

AT a recent meeting of the Physical Society of London Dr. N. W. McLachlan described a method of determining the value of the primary current at the moment of break in a magneto. This method consists in connecting a condenser across the secondary winding so as to reduce the secondary voltage below that required to cause sparking at the safety gap. The peak voltage due to interruption of the current at any speed is found, and then the interrupted direct current which will give the same peak voltage is found, which is equal to the current at break in the magneto.

Discussing this paper Dr. Norman Campbell said that it is quite possible to make satisfactory measurements on the primary current of a magneto by inserting in the circuit a small non-inductive resistance and taking the potential difference across it by means of a rotating "contactor." The total resistance inserted need only be 0.03 ohm; 0.01 for the leads and 0.02 for the measuring resistance. By the use of a suitable potentiometer method a change of 0.02 ampere can then be detected, which is ample for practical purposes. It was found that on increasing the total resistance inserted to 0.11 ohm, the current did not change by as much as 3 per cent; accordingly the disturbance caused by the resistance of 0.03 ohm must be quite inappreciable.

With this arrangement it is possible to test the accuracy of Dr. McLachlan's method by examining whether the secondary peak potential is proportional to the primary current. It was found that it was very accurately proportional when the current was changed by varying the strength of the magnets. By changing that strength within wide limits it seems possible to change all currents and potentials in the circuits without changing appreciably their ratio or wave form.

On the other hand, considerable discrepancies, amounting sometimes to 10 per cent, were found when the secondary peak potential produced by breaking a primary current generated by rotation of the armature was compared with that produced by breaking the same current supplied by a battery. His experience indicated that errors of this order might occur in using Dr. McLachlan's method (allowance, of course, was made for the E.M.F. generated directly in the secondary by rotation of the armature).

The author, in reply, stated that he had tried the method outlined by Dr. Campbell, but without the use of a rotating contactor. The results were unsatisfactory owing to the effect of transients before and after break. In order to eliminate these, it was essential that the contactor circuit should be broken before the primary. This, however, did not eliminate transients before break. Unless the interval between the breaking of the two circuits is small, errors can easily arise. Dr. Campbell's statement regarding resistance only applies at high speeds of say, 700 r.p.m. or more. At low speeds, owing to the small value of the primary inductance reactance, the current is nearly proportional to the resistance.

If the method of measuring the voltage drop across the resistance to one which gives the peak value, the current at break is measured only when the maximum value does not occur before break. If the maximum occurs before

break, as it does at retard, the peak voltage across the resistance is not a measure of the current at break, although the values so obtained may be proportional to the secondary voltage of the magneto found by altering the strength of the magnet. The question arises as to whether the peak voltage—due solely to interruption of the current, as found by Dr. Campbell's method, is proportional to the current broken when the speed is varied.

There are several ways in which discrepancies may arise in measuring the peak voltage by breaking a direct current in a magneto: (1) If the direction of the current is different from that during rotation, errors of the order mentioned by Dr. Campbell may occur. This can be tested by moving the armature through 180 electrical degrees and repeating the experiments. (2) The position of the armature at break must be found fairly accurately, since the polarisation of the core due to the magnet varies with the armature position. Polarisation affects the primary and secondary effective resistances and inductances, also the flux change due to a given current. These react on the peak voltage. (3) The peak voltage found by breaking a direct current (flowing in the proper direction) at advance or retard is not the same for all armature positions. This is probably due to some asymmetry. (4) The rectifying valve should pass no reverse current, and at low armature speeds the leakage should be extremely small. (5) Great care must be taken to prevent sparking at the separate contact breaker used for calibration. If sparking or rather arcing occur there are variations in the peak voltage, and the battery and rheostat part of the oscillatory circuit.

## Growth of German Air Force

ON the occasion of the recent Boelke anniversary the Aero Club of Berlin published some interesting figures showing the growth of Germany's air forces during the war. These are as follows:

|  | Aug.,<br>1914. | Nov.,<br>1918. |
|--|----------------|----------------|
| Machines (fighting, bombing, scouting)   | 246            | 4,050          |
| Escadrilles for defending the interior.. | 18             | 108            |
| Pilots at the front.....                 | 500            | 5,000          |
| Personnel in the interior.....           | 500            | 80,000         |
| Monthly consumption of fuel, litres....  | 600,000        | 7,000,000      |
| Machines fitted with cameras.....        | 100            | 2,000          |

QUITE often a certain line of research work will produce results not at first contemplated but perhaps as important as the result of the main investigation. In connection with the development of the large precision altimeter by the Bureau of Standards it has been discovered that a very useful improvement can be made in the method of support of the mainspring of commercial altimeters. After making this improvement in certain instruments, tests show that the lag has been reduced to one-half its original value.



# Weights and Measures Useful in Truck Body Building

These tables will become more and more useful as the influence of the truck is extended and as it becomes necessary to draft fixed rate schedules for freight carrying routes. But especially is the manufacturer interested in these items in advertising trucks for special purposes.

## Building and Contractors' Material

Asphaltum—87 lb. per cu. ft.

Brick—

Soft, 4.32 lb. each; 2.16 tons per 1000; size, 2¼x4x8¼ in.

Common, 5.4 lb. each; 2.7 tons per 1000; size 2¼x4x8¼ in.

Hard, 6.48 lb. each; 3.24 tons per 1000; size, 2¼x4x8¼ in.

Cement—Portland, barrel weighs 380 lb.; equivalent to 4 bags.

Rosendale, barrel weighs 300 lb.; equivalent to 3 bags.

Western, barrel weighs 265 lb.; equivalent to 3 bags.

|                     | Lb. per cu. ft. |                    | Lb. per cu. ft. |
|---------------------|-----------------|--------------------|-----------------|
| Clay—Dry .....      | 63              | Earth, loose ..... | 76              |
| Wet .....           | 110             | Gravel .....       | 95              |
| Crushed stone ..... | 100             | Sand—Dry .....     | 97              |
| Concrete .....      | 138             | Wet .....          | 118             |
|                     |                 | Mortar, set .....  | 103             |

## Coal and Coke

| Kind and size             | Weight per cu. ft. | Number cu. ft. per ton |
|---------------------------|--------------------|------------------------|
| Connellsville coke .....  | 26.30              | 76.04                  |
| Anthracite—Nut .....      | 56.88              | 35.16                  |
| Stove .....               | 56.33              | 35.50                  |
| Egg .....                 | 56.07              | 35.69                  |
| Cannel .....              | 49.18              | 40.66                  |
| Bituminous—Illinois ..... | 47.22              | 42.35                  |
| Iowa lump .....           | 46.51              | 43.00                  |
| Indiana block ...         | 43.00              | 46.50                  |
| Pocahontas—               |                    |                        |
| Egg and lump..            | 52.27              | 38.28                  |
| Pittsburgh .....          | 46.48              | 43.03                  |

|                         | Weight per cu. ft. | Number cu. ft. per ton |
|-------------------------|--------------------|------------------------|
| Charcoal—Hardwood ..... | 19                 | 105.25                 |
| Pine .....              | 18                 | 111.11                 |

## Cotton

Bale weighs 515 lb.; measures 27x27x54 in.; contains 23 cu. ft.

## Eggs

In crates containing 30 doz., 53 lb.; crates measure 30x12x12 in. (10 lb.).

## Milk

10-gal. can containing about 87 lb. of milk weighs 115 lb.; can measures 26 in. high, 14 in. diameter.

Case of 12 quarts weighs 63 lb.; measures 18¼x14¼x12 in.; weight of case and empty bottles, 33 lb.

| Hay                   | Weight, lb. | Length, in. | Width, in. | Height, in. |
|-----------------------|-------------|-------------|------------|-------------|
| Hay—Standard bale ..  | 210         | 46          | 30         | 26          |
| Small bale .....      | 120         | 43          | 24         | 18          |
| Straw—Standard bale.. | 180         | 46          | 30         | 26          |

To estimate the weight of hay in a mow or stack or a truck, allow 514 cu. ft. for a ton.

## Size of Barrels and Baskets

Bushel (U. S. Standard) equivalent to 4 pecks, 32 quarts, 64 pints; contains 1.2445 cu. ft., 2150.42 cu. in. Average bushel basket measures 18½ in. top diameter; 11½ in. high.

Bushel crate measures 14 in. wide, 17½ in. long, 12¾ in. high.

## Barrel

(U. S. Standard for vegetables, fruit and dry commodities, except cranberries.)

Capacity, 7056 cu. in.; 105 dry quarts; 3.281 bu.

Head diameter, 17½ in.; bilge diameter, 20.37 in.; stave length, 27½ in.

Capacity, 5826 cu. in.; 87 dry quarts; 2.709 bu.

Head diameter, 16¼ in.; bilge diameter, 18.62 in.; stave length, 28½ in.

## Flour Barrel

Weights 200-220 lb.; bilge diameter, 21 in.; head diameter, 18 in.; stave length, 28½; 28 lb. per cu. ft.

## Sugar Barrel

Weights 300-360 lb.; bilge diameter, 25 in.; head diameter, 20½ in.; stave length, 30 in.

## Syracuse Salt Barrel

Weights 280 lb.; bilge diameter, 21 in.; head diameter, 18 in.; stave length, 29 in.

Syracuse Salt—Per bushel, 56 lb.; per cu. ft., 49 lb.

Turks Island Salt—Per bushel, 80 lb.

## Liquids

|                     | Weight, lb. per gal. |                      | Weight, lb. per gal. |
|---------------------|----------------------|----------------------|----------------------|
| Alcohol .....       | 6.75                 | Oil—Linseed .....    | 7.5                  |
| Gasoline .....      | 6.6                  | Lubricating .....    | 7.65                 |
| Kerosene .....      | 7.                   | Vegetable .....      | 7.65                 |
| Molasses .....      | 12.5                 | Petroleum .....      | 8.                   |
| Muriatic acid ..... | 9.62                 | Sulphuric acid ..... | 15.25                |
| Nitric acid .....   | 11.7                 | Turpentine .....     | 7.2                  |
| Oil—Fuel .....      | 7.25                 | Vinegar .....        | 8.4                  |
|                     |                      | Water .....          | 8.33                 |

## Snow and Ice

Snow—Fresh, 5-12 lb. per cu. ft. Wet, 15-50 lb. per cu. ft. Ice, 57½ lb. per cu. ft.

Ice—(Standard block), 350 lb.; measures 11 x 22 x 44 in.

## Miscellaneous Commodities

|                      | Pounds per cubic foot |                       | Pounds per cubic foot |
|----------------------|-----------------------|-----------------------|-----------------------|
| Ashes .....          | 42                    | Paper .....           | 58                    |
| Garbage .....        | 50                    | Rubber .....          | 59                    |
| Glass—Common ....    | 162                   | Rubber goods .....    | 94                    |
| Plate or crown ..... | 161                   | Saltpeter .....       | 69                    |
| Crystal .....        | 184                   | Starch .....          | 96                    |
| Flint .....          | 247                   | Street sweepings .... | 31.5                  |
| Leather .....        | 59                    | Sulphur .....         | 125                   |
| Wool—Pressed .....   | 82                    |                       |                       |

## Angles of Incline Necessary to Dump Commodities From Steel Lined Bodies:

| Material        | Degrees | Material           | Degrees |
|-----------------|---------|--------------------|---------|
| Ashes—Dry ..... | 33      | Concrete .....     | 30      |
| Wet .....       | 36      | Earth—Loose .....  | 28      |
| Brick .....     | 40      | Compact .....      | 50      |
| Clay .....      | 45      | Garbage .....      | 30      |
| Coal—Hard ..... | 23      | Sand .....         | 35      |
| Soft .....      | 30      | Stone—Broken ..... | 27      |
| Coke .....      | 23      |                    |         |

## Road Resistance

As measured by pull in pounds per ton:

|  |       |
|--|-------|
| Over level, unsurfaced, concrete road.....                 | 27.6  |
| Concrete base, ¾-in. skin top asphaltic oil and screenings | 50.0  |
| Water-bound macadam, level, good conditions .....          | 64.3  |
| Concrete base, 1½-in. Topeka top, level, good conditions.. | 68.5  |
| Gravel road, level, good conditions.....                   | 80.0  |
| Earth road, level, fine dust, ¾ to 2 in. deep.....         | 99.3  |
| Earth road, stiff mud on top, firm underneath, level.....  | 218.0 |
| Loose gravel, new road, level, not packed down.....        | 263.0 |

## Newspaper

Rolls weigh 1200 lb.; length, 72 in.; diameter, 32 in.

# Venezuela Looks to the United States for Cars and Trucks

Having a broad system of 1800 miles of improved highways and an industrial system lacking rail transportation, this South American republic depends largely upon automotive equipment for her future development. This interesting article is written by a business correspondent who has recently returned to the United States from a lengthy visit to that country.

By Harry Chapin Plummer

**P**ARADOXICAL as the statement may seem, Venezuela, which is rapidly forging ahead as an industrial nation, has come to depend upon the automotive industries of the United States, and, in particular, upon motor-truck manufacturers, for the advancement of her progress among the producing countries of the world. The American automobile has helped the people of Venezuela to find themselves and to test and to realize their own remarkable efficiency.

The construction of a chain of 1800 miles of superbly equipped motor-highways, linking the Caribbean gateways of the country and the capital, Caracas, with such vital interior centers as Valencia, Maracay, Barquisimeto and the cities of "Los Andes," with the llanos of the Orinoco basin and with the frontiers of Colombia, Brazil and the Guianas, is among the first fruits of a change of policy upon the part of the Venezuelan Government where—under railroad expansion has been halted and the *carreteras nacionales*, as the new highway system is known officially, have been "pushed to the limit."

This nearest of South American republics—Venezuela—lies on a latitude actually north of Costa Rica and considerably nearer the mainland of the United States than the Panama Canal—has suffered socially, economically and politically ever since, in 1823, a son of her own soil, Simon Bolivar, freed her and her sister states, Colombia, Ecuador, Bolivia and Peru, from the yoke of Spain, for lack of means of internal communication.

## The Cars in Venezuela

While the Orinoco and its tributaries drain a vast area of the more southerly llanos and the Lake of Maracaibo and the Rio Catatumbo, which flows thereto, afford an egress for a good-sized region at the western extremity of the coast, Venezuela, until the second decade of the twentieth century, had little or no medium for ordinary vehicular traffic. The country depended almost entirely upon the "old Spanish trails," which were little more than burro paths and well nigh impassable in the rainy season. The few railroads served but a fraction of the republic's population and area. There are today only 1039 kilometers (645.37 miles) of railroads actually under operation. These are mainly confined to the seacoast proper.

With the coming of the new motor highways, Venezuela took to motoring and today the city of Caracas, with a population of 100,000 counts 1000 privately owned automobiles. There is one car to every one hundred inhabitants. With few exceptions, these are American-made cars, with the Hudson, Essex, Ford and Buick enjoying by far the lion's share of the trade. Aside from the competitive and manifestly effective salesmanship that

has given the cars named their advantage with the Venezuelan public, the types of construction they represent seem to have met the peculiar physical demands of the new highways, which are distinguished for heavy inclines and frequent sharp curves, especially in the more mountainous regions about the capital and the coast.

The development of utmost significance, however, is not the encouraging number of Yankee automobiles owned and used, but the fact that every one of the country's many industrial plants—they comprise large cotton and paper mills, leather tanneries, sugar centrals, cigarette, boot and shoe, saddle, trunk, baggage equipment, match, cement, ink, glass, soap, perfumery and hat factories, breweries and an abattoir and meat-freezing establishment at Puerto Cabello—depend more upon a spur to their receiving and shipping platforms from each of the smooth, broad highways on which they are situated than upon a railroad siding. Few of them, indeed, have immediate railroad connection.

## The Need for Cars and Trucks

I have cited Venezuela's budding industrial status mainly because that is the condition and the feature that most forcibly impresses the American who visits there. If the manufacturing interests have need of a quick and dependable medium for the movement of their products to the principal markets and distributing centers of the republic, as, also, for that of their equipment and supplies, both imported and domestic, how vastly more manifold must be the requirements of the older, settled agrarian and mining industries.

In a remarkably comprehensive survey of the industrial resources of Venezuela, as divided into three zones—agricultural, forestal and mining—which but lately has been prepared in Spanish and in rarely good English by Dr. N. Veloz Goiticoa, charter member of the Venezuelan section, Inter-American High Commission—the aggregate of capital invested in the cultivation, development and recovery of the products of the three zones named is placed at 1,175,186,966 bolivares (\$235,037,393). Almost any one of its divisions or subdivisions would present a weighty transportation problem. It is a foregone conclusion that these problems will have to be studied and solved by the American motor-truck manufacturer.

With a due and proper respect for the enterprise and the efficiency of the European and Canadian competition to be encountered in Venezuela and to the high standard of its products, as, also, for the price and credit considerations by which it oftentimes places the American importer at a disadvantage, it is clear that the Venezuelan business interests will follow the example of the Venezuelan motor-



## Custom and Freight Duties to Venezuela

| Tariff (Venezuela)  | Per kilo<br>Bolivares | Per 100 lb.<br>In dollars,<br>including<br>surtaxes | Freight                         |             |                                  |             |
|---|-----------------------|---|---------------------------------|-------------|----------------------------------|-------------|
|   |                       |   | La Guaira and<br>Puerto Cabello |             | Maracaibo and<br>La Vela de Coro |             |
|   |                       |   | Per cu. ft.                     | Per 100 lb. | Per cu. ft.                      | Per 100 lb. |
| Automobiles of all kinds, including tools necessary for their operation ..... | B. 0.05               | \$0.69  | \$0.30                          | ....        | \$0.30                           | ....        |
| Automotive equipment not otherwise specified .....                            | 0.75                  | 10.28   | 0.30                            | ....        | 0.30                             | ....        |
| Iron or steel tires .....   | 0.25                  | 3.43  | ....                            | 0.50        | ....                             | 0.50        |
| Rubber tires .....  | 0.75                  | 10.28   | 0.30                            | ....        | 0.30                             | ....        |

These freight rates are subject to additional charges, viz.: 5% primage + 75% surcharge + \$0.04 per 100 kilos.

NOTE—Insurance rates depend upon the standard of seaworthiness of carrier. They are naturally higher with older boats.

touring public in deciding in favor of the American car. Although merchandise from the Old World commands the respect of the Venezuelan buyer and especially so that partaking of the character of luxuries or semi-luxuries, for all things mechanical he looks to the United States. Notably is this the case with the automobile and, in particular, with the cars already named, because they have stood up under the exacting tests imposed by the Venezuelan terrain. So it is not to be doubted that the American motor truck will come to enjoy the actual supremacy when the time comes—and it now appears to be close at hand—for importing it in appreciable numbers. Had the European motor truck been found adaptable to the conditions of usage prevailing in Venezuela, it would have been introduced there long ago, along with the European pleasure car.

The new *carreteras nacionales*, while being of vital strategic influence to Venezuela, are of extreme economic significance to the manufacturing and exporting interests of the United States, quite apart from the automotive industries, in that they open up to American commerce sections of the republic that hitherto have been untouched by Yankee trade. Among these is the Cordilleras of the Andes, with historic and beautiful and cultured cities such as Merida, Tachira, Trujillo and San Cristobal that are the centers of areas of prolific yield in coffee, cocoa, sugar, corn and grain and other foodstuffs.

Venezuela emerged from the economic chaos created and inflicted by the world war in a better financial condition than any of her sister Latin-American nations. Of all the world's states, she was among the few that, during the conflict, regularly and punctually amortized her debts contracted abroad. This extraordinary fiscal position to be attained by a nation of such limited population—there are less than 3,000,000 people within the confines of the Land of Bolivar—has had the effect of placing the Venezuelan unit of currency, the Bolivar (normally equivalent to 19.3 cents in American coin) upon an enviably sound basis, wherein it has reacted to amazing premiums over its normal equivalents in the standard currencies of this country and Europe. Venezuela is enjoying an unprecedented degree of prosperity.

Dr. Luis Vélez, minister of public works of Venezuela, has thus described the advantages looked to be derived by yet another region of the country from the *carreteras nacionales* and, in particular, from the "Gran Carretera Occidental de Venezuela," which extends for 897 miles from the capital, Caracas, to San Cristobal, on the Colombian frontier:

"The benefits that must accrue to the country from this central highway are manifold and of transcendent importance. In fact, this great artery, by its extraordinary magnitude and importance, must not only develop vigorously the economic life of the regions that it traverses, but it must actually save from stagnation the important states of Southwestern Venezuela, Cojedes, Portuguesa and Zamora."

From the foregoing the idea will be gained that the

primary opportunities afforded by the development of the Venezuelan *carreteras nacionales* must be realized by the American manufacturer of motor trucks. Scarcely less abundant are the opportunities opened up to the maker of passenger cars. Indeed, the total of cars purchased within the last few years in Caracas represents an insignificant fraction of the trade yet to be accomplished there, based upon the entirety of population of Caracas and of the other communities of the republic and upon the collective wealth and buying power of the people.

## The Type of Truck Needed

As the actual transportation needs of the country are considered, the prospects become ten-fold amplified, yet with their amplification the business to be done partakes more and more of the character of specialization. Motor cars and motor trucks, as generic terms, apply up to a certain stage; beyond that the line of trade diverges in many branches, as the limbs of a tree, with the two main types forming always the root and trunk.

Even the building of the national highway system brought to the fore the question of a special design to combine the functions of roadster and truck, which was eventually evolved by the Ford car. This is outlined by the Ministry of Public Works in a recent official report on highways construction in the State of Tachira, as follows:

"The method of development of the Carretera Central de Tachira has brought forward a fact which we consider too interesting to omit mention of—that is, that trucks of great burden and, in consequence, of heavy weight, have not given practical results for road maintenance or for traffic on these highways. The cargo vehicle most truly efficient, without any doubt, is the small truck of from  $\frac{3}{4}$ -ton to 1-ton capacity, at the most, or, perhaps, even better, of  $\frac{1}{2}$ -ton.

"There actually has been constructed in the Ford factory in the United States, by direction of this ministry and destined for use on our highways for their conservation, a type of small truck of  $\frac{1}{2}$ -ton capacity, which we consider to be of great utility, not only for the service of transporting materials, such as broken stone, lime, cement, sand and even metal pieces for bridges, but also for the rapid conveyance of inspectors and chief employees of the road conservation."

Directly dependent upon the solution of the interior transportation problem in Venezuela is one of the first of the republic's industries—that of cattle raising and shipping. There range on the broad, fertile *llanos* approximately three million head of horned cattle, representing an investment of 115,000,000 Bolivares (\$23,000,000). The cattle industry sends by far the major portion of its product to Puerto Cabello. There, in the English *Congelacion de Carne* and under the technical direction of experts from Illinois, Kansas and California, cows, bulls and oxen are killed and prepared in many forms—beef, hides, bone and bone meal—for export to England, France and Italy and, in the case of the latter by-product only, to the United States.

Until the recent completion of the 56-mile highway from the interior industrial city of Valencia, which is the focal point and clearing house for the cattle trade of the highland *llanos*, to Puerto Cabello, this valuable traffic depended mainly upon an old Spanish trail, with a costly alternative in the Puerto Cabello & Valencia Railway. The latter is not equipped with rolling stock of a type suited to the movement of cattle, and the heavy grades and train shunting on which, naturally, increased the hazard of conveyance. This parallel highway and railway stretch from Valencia to Puerto Cabello represents but the relatively short final stage of a long and laborious journey from the inland *llanos* about the basin of the Orinoco and its tributaries. Until the building of the *carreteras nacionales*, this was negotiated over the poorest conceivable roads, which were little more than mere trails. There was, and there is now, no way for cattle to move from the southerly region of the *llanos* northward to Valencia and Puerto Cabello save on the hoof.

I have endeavored to sketch cursorily a condition confronting the cattle raisers and shippers of the *llanos*. Vaguely as it has been drawn, I believe it will suggest the excellent opportunity that exists for the motor truck designed specifically for the transportation of livestock, such as is now in use for that purpose within prairie areas about the larger packing centers of the western United States. Such a vehicle would be of inestimable value in getting a definite number of head of cattle from a flooded area to shelter or to places of relative safety in time of flood, and it unquestionably would minimize loss and depreciation over the heavy grades on the trans-mountain sections of highway toward the coast.

Manufacturers and shippers of automobiles and motor trucks need have not the slightest fear that in the event of their machines exported to Venezuela becoming damaged or out of repair, they cannot be put speedily into condition. There are many well-equipped garages and assembling plants in the chief cities and "gas" and pumping and tire repair stations in even the smaller communities. True, the general aspect of these would not bear comparison with the ultra-modern plants of like character in "the States." A disordered environment and working condition is easily mistaken for lack of system and of efficiency in Venezuela.

Actually I doubt if there is a more skillful, painstaking and thoroughly competent or more honest class of labor to be found on the Western Hemisphere than the *trabajadores* of Venezuela. It is made up, in the coast areas, of

negro and negro and white, and on the interior *llanos* and in the mountain regions of Indian and Indian and white.

The Venezuelans are a people of inherent arithmetical and mechanical sense. Hence it is that complicated and delicate machinery and motors are not only well conserved when entrusted to native hands but are very rarely returned to American, Canadian or European manufacturers for repair. Damaged or missing parts are sent for and the repairs effected in Venezuela.

Supervising mechanics in Venezuela are invariably graduates of the Escuela de Arte y Oficio (School of Arts and Technical Crafts) of Caracas, whose instructors have all trained at the principal technology institutes of the United States.

Gasoline, or petrol, as it is known in the republic, is obtained from wells in the State of Zulia, near the Lake of Maracaibo, which are under the operation of Venezuelan, British and American corporations—in the latter case the West Indian Petroleum Co., a subsidiary of the Standard Oil Co. of New York. The retail price has advanced appreciably in recent years and now ranges around 60 cents per gallon.

Conditions governing the shipment of automobiles and trucks into the republic present no serious obstacle, physical or monetary. At three of the largest ports which are termini for the State motor highways, La Guaira, Puerto Cabello and Ocumare de la Costa, the machine may proceed under its own power from the ship's side at commodious docks, although in the case of the former, the La Guaira Harbour Corporation, which exercises a monopoly of docking and entry privileges, imposes many restrictions and charges that well-nigh compete with the customs duties of the nation. The most of the passenger cars shipped from the United States to Caracas within the last few years have been sent up to the capital by railroad and their stationary parts and accessories assembled at destination, but they could just as well be sent over the superb trans-mountain motor road between the two cities, under their own power.

What the opportunities are in Venezuela for the automotive industries of this country may be most practically set forth, perhaps, by a citation of the motor imports into the republic for the fiscal year ending June 30, 1919. These comprised 190 cars, valued at \$193,529, and auto parts valued at \$85,864. In the first four months of the present fiscal year the imports were 123 cars valued at \$177,199, and 12 trucks valued at \$9,196. Five years ago the imports "totaled" a single car.

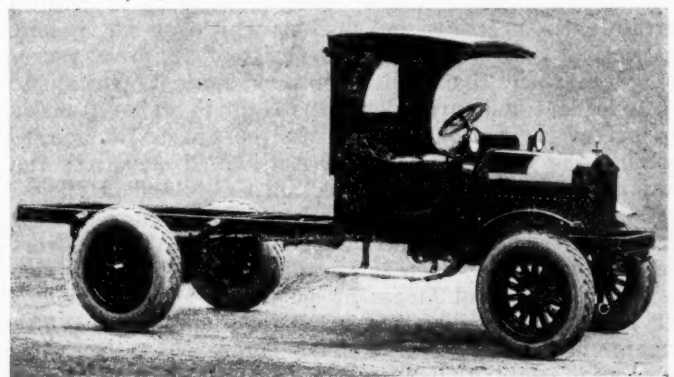
## Automobile Types for Spanish Trade

THERE is no one type of truck or automobile used exclusively in any particular country, and yet there are models for which there are extensive demands apparently founded on national characteristics or local preferences and requirements. We illustrate herewith a truck which the Quaker City Corp. has been successful in placing in both Spain and Cuba.

This is a 2½-ton truck, built for use in Madrid, but a large number of the same type have been assembled by the company in Havana for the Cuban trade. The equipment includes a Hercules engine, a Westinghouse starter and Bosch ignition. In addition to the 2½-ton type, there has been a considerable demand for 5-ton trucks and also for passenger cars.

The bodies for the overseas passenger cars will be assembled in Spain, but all hardware used in the construction will be purchased in the United States. Madrid and Barcelona are stated to be the two Spanish centers of demand for these types, and companies have been formed

for assembling the parts. In its Cuban trade, the company reports an active market for sugar cane trailers.



A truck for Spanish trade



# The Course of Labor and the Strike Tendency in Great Britain

The community of feeling between the United States and England and the similarity in customs, characteristics and action of the Anglo-Saxon, regardless of geographical locations, make this exposition by Mr. Northcott of value to Americans. It should be considered that economic trends in this country indicate our workers are striving to reproduce at home what has been accomplished across the Atlantic.

By Clarence H. Northcott

THE significance of this story on conditions in Great Britain will be understood properly, if the reader will bear in mind that the proportion of labor unionists to the population in that country is 400 per cent greater than in this country, one in every six or one in every seven of the population are members of a trade union. This means that, in most of the important industries, the trade unionists are either the total number of employees or so large a majority that their influence is exerted as though they represented the whole. Furthermore, they have controlled the rules and regulations in respect to working conditions, amount of production, hours, holidays, etc., for a sufficient number of years to have given them an opportunity for consolidating their power, and industry is accustomed to deal with and through these organizations not only in respect to strikes but in respect to all the minor questions and the rules and regulations as to employment which are coming up constantly.

Because of the complete industrial character and the trade union power in Great Britain, the action taken there will have a great bearing on the actions of the labor and economic political organizations in this country. It is for that reason that an understanding of conditions in Great Britain is absolutely necessary.—*Editor.*

THE temper of labor in Great Britain since the signing of the armistice has been a subject of world wide concern. The end of the war meant to the laboring masses an opportunity for which they had waited long and which they have exploited to the full. During the war, with some few exceptions, they had given of their best towards the nation's gigantic effort. They had agreed to give up certain rules, practices and customs which, no matter how restrictive they were in tendency and in fact, represented to them their chief bulwark against capitalism. Their leaders had surrendered the right to strike in order to further the nation's effort. In the process of administering the Munitions of War Act, which organized the national effort in munitions, certain rights and privileges were seriously abrogated. Compulsion of an obnoxious kind was exercised so that men were fined for absence from work, or were forbidden to leave their employer's service except after the fulfillment of conditions that savored of servitude too much for the British workers' liking. The nature and actions of the tribunals before which they were tried, the fact that their leaders were getting out of touch with the rank and file and the extent of the repressive

measures taken by the government when strikes had occurred during the war period, had produced a revolutionary position.

This revolutionary fever had become quite evident during the war. Serious strikes occurred in such munition centers as Glasgow and Coventry which were repressed only with severe measures against the leaders. The "rank and file" movement threatened to disrupt trade unionism by throwing over the authority and promises of the leaders. The shop steward movement not merely fostered this tendency to disruption within trade unionism, but also gave organization and leading to the forces which were out for the overthrow of capitalism and the State. When the armistice was signed, then, there was every reason to expect a stormy period for labor.

The organization of labor afforded further ground for the same fear. Trade union membership had greatly increased. In 1913 its registered membership was estimated at 4,192,000; at the end of 1918 it had become 6,624,000, an increase of 58 per cent. The clothing trades had increased 98 per cent from 1914 to 1918, the metal trades 75 per cent, while the general labor group had more than trebled in the period. During the year 1918 six unions, covering this group of unskilled laborers, added 427,000 to their membership. This increase in numbers was accompanied by federations and amalgamations among the larger unions. The most conspicuous and ominous instance of this tendency was the triple alliance of miners, railway men and transport workers. These had pledged themselves to common action under certain conditions. It was obvious that these three groups, which totalled over a million and a half of the most highly organized British workers, held a strategic position. Common action by them at the same moment would tie up British industry and precipitate something approaching a revolution. In the early months of 1918 they were each presenting separate and far-reaching demands that stood a fair chance of refusal in each case, thus producing a situation in which the triple alliance might act.

The newly awakened social sense of the workers afforded them further occasions for trade union activity. From the war they had learned the value, to them as citizens, of good wages and increased leisure. When the war ceased, therefore, they began a movement for increase in wages and reduction in hours. While, in most cases, the organized unions approached the equally organized employers in order to negotiate these issues amicably, there were many instances in 1919 where agreement was reached only after a serious and disastrous strike.

There was every reason, therefore, to expect that the year 1919 would be a stormy period in the industrial history of Great Britain. Figures recently made available show that the expectation has been realized. The year 1919 was not as stormy as 1913, if measured by the number of disputes, and not so serious in its effect upon production as the year 1912, if measured by the number of working days lost. The years 1912 and 1913 were periods of great industrial turmoil. In the former year a prolonged strike occurred in the coal mining industry. The experience of the year 1914 prior to the outbreak of war showed, in conjunction with that for the two previous years, that labor was becoming extremely militant. This militancy was largely laid aside during the war. The loss of working days and the number of workers involved in disputes during the war did not reach the totals for any one of the years 1912, 1913 or 1919. The experience of the last year, therefore, represents the combined result of the postponed questions of four years of war.

The total number of disputes in 1919 was 1,413. The total number of workers involved was over two and a half million, and the aggregate work days lost was 34,483,000. This last figure is equivalent to the loss on every working day of the year of the labor and services of about 115,000 workers. While this number is quite a small percentage of the total workers of Great Britain, it is a significant percentage of the strategic industries in which the disputes have occurred. The principal industries affected have been coal mining, the metal trades, the textile and the transport industries. The reasons leading to disputes in these industries show a combination of the causes analyzed above.

#### The Sankey Report

Thus, the Yorkshire coal miners, numbering 150,000, struck for 13 days in January, 1919, in order to enforce a simultaneous interval for mealtime for men employed on the surface. In July of the same year, these miners were idle for 19 days because a satisfactory advance in rates had not accompanied the reduction of hours in coal mines under the Sankey award.\* Prior to the sitting of the Sankey commission, 100,000 miners struck for six days to support the demand for an advance in wages which was to form the chief matter for investigation by the commission. The reduction in hours in the metal trades was the occasion in January of a stoppage of work on the part of about 150,000 workers. The arrangement of hours in the factories and foundries cut across many of the established domestic and industrial customs of the workers, who accordingly struck. Part of the trouble arose from the non-provision of an increase in piece rates to compensate for the reduction in hours so that the workers' weekly earnings should be the same. The moulders' strike which lasted from September into 1920 affected 50,000 skilled men. An endeavor on the part of the cotton operatives to obtain reduced hours with correspondingly higher piece rates, resulted after long and fruitless negotiations, in a strike occupying 18 days in June and July, and affecting 450,000 workers. The week's strike on the railway at the end of September, which involved half a million workers, was also a wage question. In sum, the chief subjects of dispute in 1919 were wages and hours.

Concrete illustration of this is afforded by an analysis of the causes of the principal disputes for any one month. If July be taken, one finds a strike in the building trades

at Plymouth against the refusal of the employers to pay increased rates of wages awarded by a conciliation board, pending ratification by the Ministry of Labor. In coal-mining, there was trouble in Northumberland and Durham over the arrangement of hours under the Sankey award, and in Yorkshire over the amount of advance on the piece rates to compensate for the reduced working hours under the same award. Metal trade workers in South Wales struck for a flat wage of £5 a week in place of a sliding scale. Hosiery workers in Leicestershire refused to accept a reduction of hours to 48 per week to which were attached provisions for the future working of overtime, introduction of extra shifts and the non-restriction of output. Some paper-mill workers struck over hours of labor and rates of wages in connection with the introduction of the three-shift system. Several other disputes are recorded, all of which turned on wage questions.

This record of industrial disturbance is, on the surface, extremely alarming. But two undoubted facts considerably offset the significance of this record for the future. In the first place, the temper of labor has grown more moderate. The ominous shadow of the triple alliance is no longer thrown over the industrial landscape. Either it was too loosely integrated or its leaders had too large a proportion of the British caution and common sense. It never really threatened anything detrimental to society and its weakness has made it a subject of reproach among those "direct actionists" who hoped through it to attain the industrial millennium. The demand for "direct action," that is, for the strike as the surest means of securing what the workers want, has been defeated by the British preference for political action. Labor has been sobered by its responsibilities and by the opportunities which are opening before it. Before long, the government of these historic islands, whose record in the world's struggle for freedom and liberty dates back to Magna Charta, will be in the hands of the Labor Party. The greatness of the responsibility thereof, and the hopes and potentialities awakened thereby, have added caution to zeal, and moderation to enthusiasm.

The second significant fact of importance in estimating the present strike situation is the development of the spirit and method of negotiation and conciliation. While such trouble as the figures for strikes indicate was caused by inability to adjust a great number of rather extraordinary demands, in the majority of cases equally extraordinary demands were met by negotiation. In the case of some of the more serious strikes, a considerable effort at adjustment had preceded militant action. The strike in the cotton centers followed upon months of fruitless endeavor to reach a settlement. The railway trade unionists have been in continual conference for months with the representatives of the Board of Trade and the Ministry of Transport. Their strike in September last was a protest against the slowness with which the negotiations were proceeding and was aimed to force a definite offer from the government.

#### Conciliation and Negotiation

The miners, as all the world knows, accepted a commission of inquiry and, later, accepted its report. On the refusal of the government to accept the second Sankey report favoring nationalization, the miners set to work upon an educational campaign throughout the country to convince the public concerning their plan, its feasibility and its necessity. The dock workers, instead of calling a strike, have obtained a commission of inquiry and are presenting their case like men who are reasonable and can afford to have their demand judged impartially on all the evidence. The engineering and shipbuilding unions,

\*The Sankey commission was formed during the latter part of the war, of representatives of coal miners, owners and the public to consider the mining industry and the grievances of the workers. Judge Sankey was the chairman. Its report made drastic recommendations for changes and severe criticisms of the present methods and conditions.



probably as militant as any in Great Britain except the miners, are at present in weekly session with employers over a number of pressing matters. The negotiations are said to have broken down but that does not diminish the significance of the preference for conciliation and negotiation. In a great number of other trades wherein considerable alterations in wages and hours have taken place, there has been an even greater degree of successful negotiation.

This is due to two reasons. In the first place, British employers have come to recognize the principle of collective bargaining and have developed on their side a network of representative organizations. These have a twofold object, one of which is, in some form or other, to negotiate with trade unions. Many of the bigger industries have a definite, agreed system of negotiation, which is never called into use while men are on strike. The presence of this machinery for the settlement of disputes is a check upon precipitate action, while the condition that strikers must return to work before they can have the opportunity for negotiation, cuts disputes short.

In the second place, there has been a great development of conciliatory machinery, mainly of the governmental type. An industrial court has been set up to which parties may refer disputes by joint consent. The act which established this court authorizes the Minister of Labor to set up an independent commission of inquiry where the circumstances seem to call for such action. It is under this provision that the dockers have been enabled to present their case before the bar of public opinion. The Whitley Councils,\* established in over 50 trades, with district councils in several instances and with preliminary interim reconstruction councils in many others, have afforded opportunities for negotiations concerning almost

\*The Whitley plan of industrial conciliation, so called because it was promoted by Mr. Whitley, calls for a National Industrial Conference participated in by representatives of employers' groups, trade unions and the public to consider national differences, and district councils similarly constituted to take care of local questions.

any aspect of industry on which discontent could arise. No other machinery, outside of that set up in several of the older industries by joint agreement between employees' associations and trade unions, affords such scope and facility for negotiation. It has one defect, in that the agreements reached are binding only on such employers as are members of the councils or are represented thereat. This defect is remedied in the case of trades which fall under the provisions of the Trade Boards Act, which can be made to apply to all employers in a trade in which a Trade Board has been set up. Since the amendment of the Act in 1918 there has been a great increase in the number of trade boards, and greater facility, therefore, for the settlement of irritating questions. In sum, the machinery just described is an unanswerable argument against the necessity for striking to obtain redress, justice or equity in industrial matters.

**The future tendency of strikes in Great Britain is difficult to forecast. In general, labor has become more moderate and is availing itself to a greater degree of the machinery of conciliation above described. But it is not becoming more content with the present economic system.**

It is out to nationalize the leading industries such as the mines, the railways, shipping, and other forms of transport. It objects to the private control of industry and to the use of the process of manufacturing for the making of private profits. The workers consider profits an unnecessary and unjust payment and hold that industry should be a social service. They want also a share in the control of industry, thereby voicing their protest and almost rebellion against the autocracy which prevails in management. They are, in fact, in revolt against the whole present economic system.

While such a spirit is abroad and such an aim is before the minds of the workers, strikes are not likely to cease. At the best, they may be expected to diminish in numbers and intensity just in proportion as the workers see before them the possibility of realizing their aims.

## Czechoslovak Trade-Mark Law

UNDER the trade-mark law of the Republic of Czechoslovakia, enacted on July 24, 1919, according to Trade Commissioner V. A. Geringer, trade-marks which had been registered with any chamber of commerce in the former Austro-Hungarian empire, to the day of enactment of the new law, will be protected in the territory of the Republic with the priority of the original application if the owner of the trade-mark notifies the proper chamber of commerce in the Republic that he wishes to avail himself of the trade-mark protection in the jurisdiction of the Czechoslovak State. Three copies of the trade-mark, the identity of which should be certified by the chamber of commerce which originally registered it, should be attached to the application, and applicants whose trade-marks were registered with any chamber of commerce in former Austria-Hungary, outside of the territory of the Czechoslovak Republic, should additionally attach a certified abstract from the trade-mark register. The expired period will be deducted from the 10 years' period of protection.

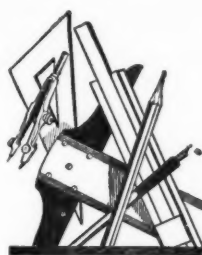
Trade-marks of aliens which had been registered only with the Vienna Chamber of Commerce or only with the Budapest Chamber of Commerce will be protected at their request within the entire jurisdiction of the Czechoslovak Republic with the original priority.

But in the territory where hitherto they have not been in effect they will be subject to the rights of third parties. Trade-marks with the picture or a name of the President

of the Republic or other persons who have been of great service to the State and are generally well known, seals, devices, mottos and coats of arms of States and municipalities or medals, can be registered only if on the basis of present regulations the right to use these special marks has first been established.

A person who has not a fixed residence in the territory of the Czechoslovak Republic can file an application if the laws of his home State extend the same privileges to the subjects of Czechoslovakia, provided also he appoints a duly authorized representative in the Czechoslovak Republic. The period of protection is 10 years. To September 18, 1919, 1720 of new trade-marks and of those already registered in former Austria-Hungary had been presented for recording in the central trade-mark register; 56 of these because of noncompliance with the laws relating to trade-marks had been rejected and 122 had been temporarily withheld.

On substantially the same basis patterns, designs, drawings and representations, showing forms, shapes and the outward appearance of specimens and models of goods and manufactures are protected under the law of July 24, 1919, which confirms otherwise the provisions of the old Austrian law relating to the subject. In this case, however, two samples of the article or its picture along with a certificate of identity shall be presented with the application. Protection is granted for one, two, or at most three years.



# The FORUM



## Engine Design for Pneumatic Trucks

Editor AUTOMOTIVE INDUSTRIES:

FUELS are not going to improve in volatility but rather will decrease, reaching an end point of 500 deg. F. in 1925. This, we estimate, will be higher than the average offered then but will have to be handled well by the vaporizers if the motors are not to be injured. Therefore, for a given size engine, there must be an allowance made for the loss in weight of charge due heating mixture and, hence, in power. Likewise, an allowance will be made for lower compression possible because of the detonation tendency of higher end point fuels. For a given engine displacement, the loss in power due to all these factors will be at least 10 per cent at medium speeds. Therefore, to maintain power at a given speed, the displacement should be at least 11 per cent greater.

Pneumatic tires for trucks are only a matter of development. They must come, for they solve so many mechanical and transportation problems. Pneumatic tires mean speed of truck and, in order to keep high the ratio of net to gross weight and economy of engine performance by maintaining a high load factor, the engine must be of higher displacement but also must be capable of higher sustained engine speeds. For a given sized truck, it is advisable to use at least 20 per cent higher displacement for pneumatic tires. We, therefore, have an engine of 33 per cent greater displacement for a given capacity of pneumatic tired job with poorer fuel than with solid and good fuel.

We must have greater speed of engine for the purpose of added power to sustain the higher truck speeds on the higher gears. Higher motor speeds will lessen the detonation tendency of lower grade fuels. Higher engine speeds mean lighter engine weights per power developed, a factor that reduces tractive resistance as well as gross weights.

Higher engine speeds demand stiffer crankcase and crankshafts and larger bearings. This is particularly true of the center crankshaft bearing and rod bearings. Class B practice of center and rear bearings alike, with front main and rod bearings alike, admirably meets the problem of increasing speed, as well as attaining a service ideal. High engine speeds make it imperative to have connecting-rod bearings on the piston center. Offset rod bearings have no place on modern engines. This is particularly necessary for smooth running when the engine is old. High engine speeds under load are not detrimental to well-constructed engines, but high speeds with no load are very damaging. We, therefore, plan for a maximum speed governor to hold the idle speed within reason.

Smaller engines can run at higher speeds, due to better cooling, hence the crankshafts should be relatively larger. We have, therefore, made all engines from 289 in. to 492 in. displacement of the same diameter of crank, with all camshaft holes the same as crank, so that service reamers can be used on main rods and camshaft bearings.

High speed in engines demand ample valve capacity,

which need not mean larger valve sizes or excessive lifts. For economy, gas velocities should be such as will assure good turbulence of charge, giving higher velocities.

For highest economy of operation the engine should be so designed as to give a flat economy curve, and special effort should be made to give a good economy for half loads and less. The application should be so worked out that the average speed of truck corresponds to the speed of maximum economy, and when in this position the speed of maximum torque will be about 10 per cent lower. Trucks seldom average over 50 per cent of the governed speed.

High engine speeds demand a water pump of special characteristics. A centrifugal pump which will give ample water at speed is usually unfit for slow truck speeds at high temperatures. If satisfactory for slow speed and high temperatures, it keeps the water temperature too low for economy at high speeds.

There are reasonable limits beyond which it is not practical to go, either in piston speeds or r.p.m. Therefore, some of the increase in truck speed must be provided for in gear ratios.

The difference between some stock engines of old types and new types may be expressed as follows: An old-type engine would not go one-tenth as long at 1800 full load as a new-type engine.

On high-speed engines valve trouble will be greater and some effort at rotation will probably be necessary.

Far better engineering and experimental work will have to be done on the trucks designed for pneumatic work than has been done on solid-tired job. The present practice of letting over-enthusiasm force acceptance of a new model will give way to a persistent effort to attain an ideal in performance.

H. L. HORNING,

Gen. Mgr., Waukesha Motor Co.

## Mr. Warner's Terminology

Editor AUTOMOTIVE INDUSTRIES:

I DID not think that anyone would have difficulty in comprehending the terminology of my article in AUTOMOTIVE INDUSTRIES for Jan. 22, as the meanings of all the symbols, in addition to being identical with those invariably used, were either explicitly defined somewhere in the article (in the mathematical appendix in some cases) or appeared to be perfectly clear from the context. However, if there has been any trouble, it might be well to publish the list below.

V=speed of flight

N=r.p.m. of engine

D=propeller diameter

Q=propeller torque

V

— = "slip function"

ND

V'

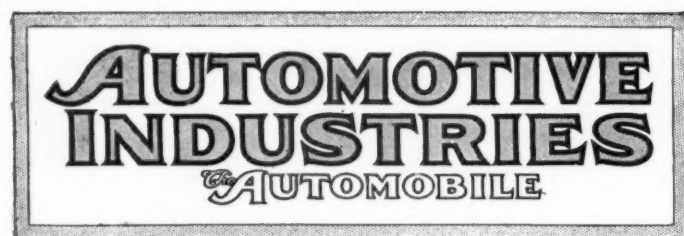
— = "slip function" for best efficiency

ND

P=geometrical pitch of propeller

EDWARD P. WARNER.





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## A Blow at Export Trade

THE demand for economy in Government affairs is being heard by Congress, but business men should closely watch this tendency and see to it that this economy move does not go in the wrong direction. One of the latest reports from Washington indicates that Congress is striking at appropriations without a proper knowledge of the use of the money.

The appropriation referred to is that for the maintenance of the foreign trade promotion staff. The amount asked by Secretary Alexander of the Department of Commerce was \$1,658,000, and this was reduced to \$490,000, is the committee recommendation. This would mean the curtailment of the department's activities instead of the expansion that every merchant or manufacturer interested in export trade has been hoping for. In addition to a lessening of the force in the foreign fields, it would bring about the closing of some of the offices maintained in cities in this country through which contact is maintained with firms looking into this trade.

Readers of AUTOMOTIVE INDUSTRIES are familiar with the excellent trade reports supplied by this serv-

ice, and this publication has heard many comments as to the practical helpfulness of the service. The automotive industry is much interested in the development of the export trade and it will need all of the assistance it can obtain. Much of the investigation is expensive and it will be impossible for a single firm to undertake it. The industry should have all the assistance in gathering of data that it is possible for the Government to extend.

Automotive manufacturers and others should communicate at once with members of Congress protesting on the reduction of the appropriation for this necessary investigation. It would be false economy for the Government to limit the export trade by such a move.

## Three Speed Tractors

UNTIL the present year it was the general custom to provide farm tractors with two forward speeds, the higher one for plowing under normal conditions, and the lower for plowing in extra hard soil. This year a good many manufacturers have gone to the three-speed gear, making the intermediate speed the direct drive which is normally used for plowing. The top speed is then a geared-up drive and is necessarily somewhat less efficient, but in any work for which the high speed can be used this is of minor consequence, as the draft is not likely to be very heavy. The advantage gained is that it makes the tractor applicable to a large variety of conditions and relatively efficient under all. Its mechanical efficiency will be high under normal operating conditions which prevail most of the time. If the work is of such a nature that high speed is permissible, the tractor is capable of operating at this speed, and if an extra heavy draw bar pull is required, the tractor can deliver this by means of the low or emergency speed.

The tendency toward an increased number of gear changes is general. One tractor shown last year without any change gear this year had a two-speed gear, and the number of tractors with three-speed gears is decidedly greater than last year. When using kerosene as fuel the internal combustion engine is not flexible, and what flexibility is desired in the tractor must be provided in the gear.

## Government as a Business

THE business interests of the country should be interested in a bill introduced by Representative Moore of Virginia for a survey of the activities of the U. S. Government to eliminate duplication in activities. If this survey would be made properly, it would be a great relief to business because of the elimination of practically duplicate questionnaires and also by reduction of expenses. It, undoubtedly, is a move in the right direction and, unless the survey becomes as complicated as some other Government activities, it would mean a better Government in every way, as well as a step in the direction of economy.

## Getting Back to Sound Business

There has been considerable discussion in the press and among business men as to when the period of reconstruction, following the war activities, would begin. To some persons the failure to note a radical change has been a disappointment; most of us expected some period when we could see or feel that the currents were changing. But that period has not been apparent.

Now it appears that the time is at hand. This indication is noted in the annual report of the Federal Reserve Banking Board and in talks by bankers at meetings of bankers and business men. Notable was one by Frank A. Vanderlip, whose standing as a banker needs no recommendation here. All of these indications agree as to a cause of the present situation and in the suggested remedy. The remedy, it is pointed out, must insure against further speculative inflation and the competition with sound business to which such inflation invariably leads.

The present situation, as agreed by bankers, can be stated by quoting Mr. Vanderlip informally. The act creating the Federal Banking System contained clauses that so changed banking conditions as to permit a member bank to increase its loans to five times the proportion its deposits and reserves as previously allowed. Against this financial freedom, with its lawful limitations, the Federal Reserve Board was given a brake in the form of the privilege of raising the interest rate. This could be used at any time to check the amount of loans.

During the war, when the Government was needing money more rapidly than it could be raised by taxation, the Federal treasury was the greatest borrower, and the Federal Reserve Board saw the need of giving cheap credit to the Government. Naturally, the rate made for the Government had an influence on the rate extended to business firms. The Reserve Board was unwilling to assume the responsibility of extending cheap credits to the Government and high interest credits to business, especially at a time when the Government's activities were so closely allied with those of business.

Now it appears from Treasury Department statements that the need of extensive and cheap borrowing on the part of the Government has diminished and the Reserve Board has practically decided to use the brake power and raise the interest rate to check borrowing for business. The idea behind this move is that cheap credit has created an inflation of business and, even more so, speculation. Men are expanding their factories and other activities more than they would under higher interest credit. Some of this cheap money has been used for speculative factory expansions. The result is business inflation and the spreading thinly of the available labor.

The result of the higher interest rate, as the bankers see it, would be to curb speculative expansion. The added per cent would make the business man planning extensively for the future think twice and carefully analyze his sales prospects, not only for the few months after his new factory would be completed, but for a more extended period. The result would be a readjustment to a conservative or normal basis of planning business.

The bankers admit freely that this change is going to cause embarrassment to some persons and firms. Plans will have to be changed somewhat. Some sites bought for new factories will not be used at once. Production in existing plants will have to be intensified rather than spread through new buildings. If these new buildings were constructed and equipped they probably would be undermanned for some time to come because the labor does not seem to be available for the present working facilities.

The bankers are asking the men and firms who may be embarrassed to accommodate themselves to circumstances and to console themselves with the thought that they probably will be in better shape to meet future conditions than if the present inflation was permitted to continue to grow until the gas bag burst and all business dropped with a dull thud.

Bankers, of course, are not infallible as prophets, but they are the best material we have for looking into the financial future, and business should listen to them. We must admit, at least, that the bankers are sincere in their efforts to draw the curtain from the future and, as they hold control of the money vaults, it will be better to meet them gracefully than to be violent about something that business cannot help.



# Mercer—Locomobile—Simplex

## Under Hare's Motors Control

**Central Organization Will Direct Operating Functions of Three Companies Which Will Remain Separate Entities—Plans Development of New Models**

NEW YORK, Feb. 27—Emlen S. Hare has announced the formation of Hare's Motors, an operating company to control jointly the Locomobile, the Mercer and the Simplex companies.

Immediate increase in the output of the present factories will be one of the results of the plan of joint control, and the addition and development of more transportation units, passenger and truck, will follow.

In this new venture, the former vice-president of the Packard Motor Car Co. of Detroit and the Packard Motor Car Co. of New York has adopted the keynote of "quality with quantity production" and has promised the creation of a line of non-competitive cars and commercial vehicles to meet the various transportation demands.

To accomplish this ideal he has surrounded himself with men with established reputations in the design, production and merchandising of quality cars and trucks. H. D. Church, formerly chief engineer of the Packard truck division, is vice-president of Hare's Motors in charge of engineering development. Working with him as vice-president and consulting engineer is A. L. Riker, formerly vice-president and chief engineer of the Locomobile Company of America. O. E. Hunt, formerly chief engineer of the motor division, Packard Motor Car Co., enters the company as vice-president in charge of production and also as vice-president of the Locomobile, Mercer and Simplex companies. In charge of distribution and maintenance is Henry Lansdale, formerly general carriage sales manager of the Packard company.

### Department Heads Named

Flanking these leaders in the creation of his operating organization Hare has F. Van Z. Lane, former general transportation engineer of the Packard company, as general maintenance manager; E. A. Travis, formerly general sales manager of the Locomobile company, as general distribution manager; J. A. Kingman, formerly general advertising manager of the Locomobile company, as general advertising manager, and W. A. Smith and P. W. Hine, of the Mercer and Locomobile sales departments, as distribution managers of their respective divisions. E. J. Ross, formerly manager of the Government division, The Locomobile Company of America, is export manager.

With this nucleus established and backed by the facilities of the Locomobile and Mercer factories, and with sufficient financial backing pledged to en-

sure the successful launching of the venture, Hare has set an objective of \$200,000,000 business a year after five years.

He has given definite assurance that the present models of both the Locomobile and Mercer will be continued, and in addition to this that a "little" Locomobile to sell in the vicinity of \$2,000, will be put in production next year. The development of the truck line will come later and will provide a complete range. The object of the creation of the "little" Locomobile is to supply the demand for a moderate priced car of the highest quality compatible with price, that will fill out the line of non-competitive units and sell in quantities sufficient to insure, with the Mercer, a sufficient income to the dealers handling the entire line.

### Would Make 20,000 a Year

Hare points out that by applying quantity methods in the production of these quality cars, it should be possible to manufacture and merchandise 20,000 cars a year at about \$7,000, 50,000 a year at \$4,000 and a great many at \$2,000. But no reduction in the price of Locomobile and Mercer cars is promised in the next year, because of the material situation which now demands long-period contracts at prevailing prices.

Although no immediate changes are contemplated in the construction of the merchandising organization of Hare's Motors, President Hare said, in answer to questions, that it was desirable that the full line of cars and trucks eventually be handled by single distributors and dealers in their respective territories.

In presenting Hare's Motors to a representative gathering at a luncheon in the Hotel Claridge, Hare said:

"Hare's Motors has been organized not merely to centralize control and to direct production and distribution of the factories thus brought together. This action is simply the first step in a new plan as it involves an interesting quality-quantity conception; and its scope will be wide, embracing the entire passenger car and truck field."

He summarized the broad general program of the enterprise in these words:

"Briefly, our organization is dedicated to a new principle of building. The purpose is to supply automotive passenger and freight transportation of the highest quality, to make this sort of transportation available to the greatest possible number of users through quantity engineering, production, distribution and maintenance methods."

The Locomobile, Mercer and Simplex companies will retain their respective identities as individual corporations. The Locomobile and Mercer plants will operate solely as manufacturing establishments in that the departments of engineering, distribution, maintenance and advertising will be removed and operated as departments of Hare's Motors.

All matters of general administration, engineering development, major finance, etc., will be handled by Hare's Motors with executive offices at 16 West 61st Street, New York City.

The present organization was effected through the following steps:

Last October Mercer Motors Co. acquired the property of the Mercer Automobile Co.

In December the Locomobile Co. was organized to take over the property of the Locomobile Company of America, Mercer Motors receiving at that time a substantial interest in the Locomobile Co.

In January the Mercer Motors Co. absorbed the Simplex Automobile Co., manufacturer of the Simplex and the Crane-Simplex cars.

Hare's Motors was then organized, owned jointly by the Locomobile Co. and the Mercer Motors Co. Now Hare's Motors takes charge of the Locomobile Co., Mercer Motors and Simplex companies.

## French Want Tractor Subsidy Continued

PARIS, Feb. 4 (*Special Correspondence*)—The French Government subsidy given on the purchase of an agricultural tractor has been abolished when the machine is of foreign origin, and has been reduced to 25 per cent of purchase price when machine is of French construction.

This measure has created discontent among farmers, many of whom had purchased tractors on the promise of the Government that a subsidy would be granted. A protest has been sent to the Agricultural Department of the French Government by one of the leading French automobile clubs. In this protest it is pointed out that agricultural tractors have been adopted owing to the shortage of labor, and any measure which discourages their use will result in a shortage of wheat.

On an average an agricultural tractor in France ploughs 250 acres of land a year, this producing on a minimum 80 tons of wheat. In order to meet the present deficit the French Government is obliged to purchase wheat abroad, and loses on this operation \$114 for every 1000 lb. of wheat purchased. Every agricultural tractor in service in France economizes the State's funds to the extent of \$8,000, and as the subsidy which has been given in the past never exceeds \$2,000 and in many cases is less than \$1,000, there is a net saving to the Government of \$6,000 for each tractor put into service. French farmers insist on the maintenance of the tractors subsidy and protest against any difference being made between tractors of foreign and French construction.

## Many New Airplanes For New York Show

Remarkable Development of Air Transportation Industry to Be Exhibited March 6-13

NEW YORK, March 2—An excellent exposition of airplane engines, model landing field, factory testing devices and airplane equipment is promised at the Second Annual Exposition of the Manufacturers' Aircraft Association, which will be held in the 71st Regiment Armory at 34th Street and Park Avenue, New York, March 6 to 13. It is purely an American show and indicative of our progress in air transportation. Twenty types of aircraft will be shown by leading manufacturers. These range from tiny monoplanes weighing less than 500 lbs., built to carry but one person, to the huge air mail planes of ten tons weight and capable of carrying three tons of useful load. Among the other exhibits will be the two, three and ten passenger seaplanes for sport use and air touring. Several new flying-boats of startling design are to make their maiden bow.

Among the accessories that will attract particular attention is the radio directional device, several types of which are to be shown.

A distinctly new type of aircraft, a sporting dirigible, will be exhibited. The new craft is a Goodyear Pony Blimp designed after the lines of the huge blimps that are of great service for naval observation. It is designed to meet the desires of balloonists for a lighter-than-air ship with an adequate cruising radius and ceiling. The useful lift is 800 lb., though on trials the pony blimp has carried 935 lbs., including passengers, ballast, anchors, drag ropes, parachute and fuel. It is 95 ft. long, 38 ft. high and 28 ft. in diameter, motored with a 4-cylinder 16 valve, 40 hp. Ace engine mounted as a pusher. The pony blimp showed a trial speed of 40 miles an hour. It has a range of about 400 miles or ten hours of cruising speed.

### Curtiss to Show Wind Tunnel

Another interesting exhibit will be the model wind tunnel shown by the Curtiss Aeroplane and Motor Corp. The new tunnel is in three sections—the collector into which the air stream flows, experimental chamber in which the tests are made and the diffuser through which the air stream leaves the tunnel.

The Aeromarine Plane and Motor Co. of Keyport, N. J., will exhibit one of its new model 50 "B-2" flying limousines. It has a hooded cabin in which both pilot and passenger are shielded from the wind. The interior is finished in blue leather upholstery. A powerful 150 hp. aeromarine motor enables the air-limousine to maintain a speed of 75 m.p.h. for three and one-half hours in the air. This flying boat weighs 3100 lb. and carries a useful load of 820 lb.

The Dayton-Wright division of the General Motors Corp. will show a Dayton-Wright cabin cruising model K-D,

a purely commercial airplane built for passenger carrying or freight. It is powered with a Liberty 12, giving a maximum speed of 120 m.p.h. and weighing 2685 lbs. empty. The seating arrangement affords comfortable quarters.

Orville Wright will show a model O-W air coupe, equipped with a Hispano-Suiza motor. There is room for three passengers to sit comfortably in the upholstered chairs. The coupe weighs 2492 lbs. and carries a useful load of 1042 lbs.

The Owl, designed and built by the L. W. F. Engineering Co. of College Point, L. I., is the largest entry of the Aircraft Exposition. It is announced as the world's largest air freighter. The Owl is a land machine of 1200 hp., capable of supporting a load of 20,000 lb.

### Ford Advances Prices on Cars and Trucks

DETROIT, March 4—New Ford prices, effective to-day, show an increase of \$50 on open models and \$100 on inclosed models and Fordson tractors. Truck prices advance \$50.

The inclosed models now sell at \$850 for the coupe and \$975 for the sedan. That includes full equipment. Heretofore the price was \$200 less, with demountable rims and electrical equipment costing \$100 extra.

The Ford Motor Co., with a schedule of 1,000,000 cars in 1920, closed the first seven months of the fiscal year, Feb. 28, with a record of 557,372 cars. Despite the freight congestion and trouble in getting parts, Ford production for March, April, May, June and July is fixed at 100,000 cars each month. At the present rate the output will exceed the contemplated production by 250,000 cars for the fiscal year.

Despite this large output, Ford's unfilled orders on Feb. 10 were 23,492 cars.

In addition to the passenger car program Ford plans to build 150,000 trucks during 1920. The plant turned out 12,000 trucks in February.

### Willys to Increase Stock to \$125,000,000

TOLEDO, OHIO, Feb. 27—Willys-Overland stockholders will meet March 24 to vote on a proposed increase in the capital stock from \$75,000,000 to \$125,000,000. The additional stock, consisting of \$25,000,000 of junior preferred and \$25,000,000 of common is to be issued at the discretion of directors.

Earnings of the company for the present quarter will reach \$3,500,000, which, according to Willys, will increase during the year, making an annual profit conservatively estimated at \$16,000,000. According to Willys the company's inventory shows \$40,000,000 invested in raw material.

## Metric System Is Opposed in England

Motor Trades Involved in General Division Over Question—Catalogs Use Both

LONDON, Feb. 13—(*Special correspondence*)—Although there is a certain amount of favor toward the metric system in Great Britain, it is not as large as might be inferred from the inspired literature circulated by reformers. The motor trade probably is as divided on this matter as any section of the engineering trade, the drafting offices and the factories using metric figuration, while the repairshops and public favor the inch scale. The public as users of motor vehicles find the rift curiously reflected in the makers' catalogs and lists. It is very common to list the bore and stroke in inches and decimals, but tires are almost always in millimetres. American catalogs are showing the same trend, whereas formerly they invariably used the inch scale.

A vigorous program is being pushed here by the metric enthusiasts, and recently a State committee was appointed to deal with the problem. This body is due to issue its report, and it is believed that it will be unfavorable to the change advocated by these reformers.

A recent remark of the president of the Board of Trade lends support to this view. He made his remarks to a deputation of the Trades Union Congress in answer to a question; the trades, it is understood in general, being opposed to the change. The president of the Board of Trade said there were certain advantages in the system, and there were great disadvantages in the process of introduction. He said:

"More than half of the export trade of this country was with countries that did not use the metric system and did not intend to adopt it. In the textile trades the largest and most extensively used was the British system which so many people condemned. Supposing that it was decided to pass from the yard to the metre, it would mean the replacement of practically the whole mass of textile machinery. That could not be done in a day, and it could not be done in twenty years, and during the period of change the difficulty of running the two types of machines would be great.

"The consequent dislocation of the trade which would result would be enormous. Nobody was prevented from using the metric system, and it had been left to the process of natural selection, which was usually more effective than anything which might be preconceived."

ENGLISHMAN.

### AIR SCHOOLS PLANNED

WASHINGTON, Feb. 27—Fifteen special Air Service schools will be established at the various flying fields by the Air Service following authority for the establishment of these schools granted by Secretary of War Newton D. Baker.



## Schroeder Uses New Equipment in Climb

Moss Supercharger and Aniline Fuel Constituents Make New Altitudes Possible

DAYTON, March 1—Major Schroeder's altitude record of 36,020 ft. on Feb. 27 here was made possible by the combined use of the Moss supercharger and a special fuel constituent developed by the C. F. Kettering laboratory. The supercharger was originated by the General Electrical Co., being the design of Dr. Sanford A. Moss. The engineering department of McCook Field is responsible for its perfection. The fuel component is a special compound of the aniline series and is added to the gasoline. Its purpose is to remove the tendency to detonate and to permit of the high compression ratios provided by the supercharger.

Major Schroeder, who is now recuperating from his narrow escape in the recent flight, states that his machine was functioning perfectly when he reached his maximum altitude.

Ordinarily an airplane loses about 50 per cent of its power at 18,000 ft., due to lack of oxygen. With the supercharger the Liberty engine developed practically its full horsepower at the high altitude and only lost climbing speed because of the atmospheric pressure drop.

The plane fell into a tail-spin when its operator lost consciousness, due to failure of his oxygen supply.

This mishap occurred when the plane was otherwise in perfect condition to have reached 40,000 ft., which is the mark at which Major Schroeder aimed. Not only did Major Schroeder lose consciousness, due to lack of oxygen, but his sight was temporarily destroyed because of the freezing of his eyeballs, due to removing his goggles in attempting to adjust the oxygen supply. The instruments on the machine registered 67 deg. below zero.

Major Schroeder regained consciousness for a brief lapse of time just above the field and almost by instinct and practically blind he managed to make a landing before again losing consciousness. He is at present recuperating and states that he intends to make another attempt. The machine is at present being rebuilt.

### La Pere Plane Used

Government censorship draws a veil over certain details of the machine, but it is known that the plane was the standard Le Pere type built at the Packard factory and equipped with the same ignition system as in wartime types. The pilot was literally wrapped in electrically heated clothing and in addition wore a suit lined with heavy fur.

He was equipped with an oxygen mask of his own design, connected to the main auxiliary tanks. The supply at the main tank failed and he had only the auxiliary supply to draw on, which caused the shortage.

An interesting feature of the descent, in which the plane fell more than five miles in about two minutes, is the fact

that the change in pressure from 3 to 15 lb. a square inch crushed the gasoline tanks and caused a serious dilation of the pilot's heart.

Army engineers here who have inspected the plane say that nothing but the failure of Major Schroeder's oxygen supply could have prevented his topping the 40,000-ft. mark, and they know the major and the machine well enough to express their confidence in the success of his next trip.

## Gasoline Economy Campaign Planned

NEW YORK, March 2—The National Automobile Chamber of Commerce, in conjunction with the National Automobile Dealers' Association and other organizations, is planning a gasoline economy campaign.

Data on this subject will be incorporated in the instruction books of all manufacturers and the idea will be advanced to the dealers of the country that they advertise and recommend the adjustment of carbureters. It is suggested that a flat rate for this service be made in order to encourage motor vehicle owners to have the adjustments made as a means of checking gasoline consumption.

An appeal also will be made to truck drivers not to run their engines continually. At present, due to the fact that trucks are not equipped with starters, the drivers generally leave the engines running during delivery stops.

This step by the national associations is to be made as a result of the present upward trend of crude oil prices which is bringing with it advanced gasoline prices. That gasoline prices must go higher, in view of the present conditions in the crude oil field, is the opinion of experts in the Bureau of Mines, with whom Al Reeves, of the N. A. C. C., conferred recently in Washington.

## LaFayette Production to Be Started in May

INDIANAPOLIS, March 1—LaFayette Motors Co. will start production in May and deliveries in June, in line with its schedule.

All fear of a delay in production has been dissipated by the rapid acquisition of a force of skilled mechanics and automobile workers, many of whom left other automobile plants voluntarily, in order to hook up with the LaFayette organization. Many of them have had valuable experience in airplane engine shops, government aviation camps and French flying fields.

### ARMY TOOLS FOR SCHOOLS

WASHINGTON, Feb. 24.—The transfer of machine tools, machinery and other supplies from the War Department to the Federal Board of Vocational Education is authorized by a bill introduced into the House by Congressman Treadway. These supplies and tools would be used to educate and rehabilitate discharged soldiers, sailors and marines.

## Duesenberg First in Los Angeles Race

Goes 250 Miles on New Mile and a Quarter Track Without Stop in 2.23.18

LOS ANGELES, Feb. 29—Fifty-five thousand spectators witnessed the opening championship event at the new board speedway at Beverly Hills this week. No new records were created, but in the excellent time and many exciting spurts of the contestants the spectators found ample thrills. Two postponements and a day of threatening storms had no effect on the ardor of the crowd.

The speedway track is a mile and a quarter and the entire plant represents an outlay of almost \$1,000,000. There will be but two championship races a year, so it can be seen enormous crowds will have to attend to put the proposition over. The automobile dealers closed their doors and made a holiday of the event.

"Jimmy" Murphy, in a Duesenberg, drove a non-stop race for 250 miles and won easily. He averaged 103 m.p.h. Ten prizes were offered, totaling \$25,000, but only nine of the 18 cars that started were able to finish. Those that participated in the money were driven by Murphy, Thomas, Vail, Sarles, O'Donnell, Hearne, Mulford, R. DePalma, J. DePalma, finishing in the order named. Those eliminated were Boyer, Klein, Goodson, Pullen, Stein, Hill, Durant, Dutton, Millon. Broken connecting rods were the chief cause for elimination.

In addition to being the opening event in the new speedway, and for the year, this was the first of the championship races. Each of the nine drivers who finished was awarded points that will be included in determining the championship driver for 1920. The race was run under the supervision of the A. A. A., and prominent officials of that body attended. It was free from an accident of any kind, the nearest approach being when a wheel broke on Klein's car while making 104 m.p.h. on one of the turns. His car happened to be in the clear at the time and slid down into the safety zone without overturning.

### NEW ZEALAND CHANGES DUTY

WASHINGTON, Feb. 28—The Government of New Zealand has placed a flat duty of 20 per cent on all motor cars without regard to the country of origin, according to a report received by the Bureau of Foreign and Domestic Commerce from Trade Commissioner Melbourne. Formerly the chassis came in free of duty from the United Kingdom, and the British Empire, and was subject to a duty of 10 per cent ad valorem from other countries, while bodies were dutiable at 20 per cent ad valorem. The duty is now 20 per cent on the car as a whole, but separate chassis continue to be admitted free from the United Kingdom and at the rate of 10 per cent from other countries.

## Automotive Exports for December

| COUNTRIES                       | TRUCKS |           | CARS   |           | PARTS     | TIRES   | GAS ENGINES |         |
|---------------------------------|--------|-----------|--------|-----------|-----------|---------|-------------|---------|
|                                 | Number | Dollars   | Number | Dollars   | Dollars   | Dollars | Number      | Dollars |
| Austria-Hungary                 |        |           |        |           | 750       | 10,800  |             |         |
| Belgium                         | 6      | 7,559     | 142    | 170,400   | 2,217     | 84,467  | 47          | 46,150  |
| Bulgaria                        |        |           | 1      | 3,220     | 307       |         |             |         |
| Denmark                         | 38     | 62,870    | 95     | 144,509   | 10,614    | 189,939 | 3           | 2,733   |
| Finland                         |        |           |        |           | 15        |         |             |         |
| France                          | 68     | 326,243   | 62     | 96,779    | 516,526   | 208,638 | 280         | 229,607 |
| Greece                          |        |           | 34     | 53,103    | 4,082     | 28,129  |             |         |
| Iceland and Faroe Islands       | 1      | 300       | 6      | 4,450     | 2,219     | 701     | 1           | 1,350   |
| Italy                           | 1      | 1,700     | 9      | 28,475    | 6,671     | 82,528  | 1           | 900     |
| Malta, Gozo, and Cyprus Islands |        |           | 12     | 5,851     | 24        |         |             |         |
| Netherlands                     | 30     | 53,547    | 258    | 267,824   | 15,753    | 186,139 |             |         |
| Norway                          | 14     | 30,723    | 46     | 52,553    | 56,991    | 71,323  |             |         |
| Portugal                        | 7      | 17,034    | 30     | 36,772    | 2,640     | 19,214  | 3           | 4,596   |
| Roumania                        | 1      | 2,178     | 8      | 20,333    | 378       | 23,972  | 8           | 10,542  |
| Russia in Europe                | 1      | 503       | 15     | 7,246     |           | 1,250   | 7           | 9,000   |
| Spain                           | 78     | 154,065   | 271    | 297,737   | 41,207    | 118,981 | 57          | 60,406  |
| Sweden                          | 4      | 8,243     | 30     | 44,969    | 799       | 54,628  |             |         |
| Switzerland                     | 6      | 9,527     | 168    | 205,224   | 989       | 81,461  | 18          | 14,336  |
| Turkey in Europe                |        |           |        |           | 200       | 32      |             |         |
| England                         | 391    | 552,136   | 848    | 986,317   | 1,025,618 | 340,998 | 87          | 68,216  |
| Scotland                        |        |           | 5      | 3,694     | 1,588     | 65      | 1           | 600     |
| Ireland                         | 1      | 867       | 215    | 209,831   | 250       |         | 88          | 49,360  |
| British Honduras                |        |           |        |           | 505       | 400     |             |         |
| Canada                          | 128    | 215,969   | 445    | 644,765   | 1,661,269 | 67,412  | 227         | 203,182 |
| Costa Rica                      |        |           | 2      | 3,369     | 1,901     | 1,715   | 2           | 2,881   |
| Guatemala                       | 1      | 1,414     | 3      | 5,300     | 1,257     |         |             |         |
| Honduras                        |        |           | 11     | 6,541     | 2,251     | 1,787   |             |         |
| Nicaragua                       | 2      | 5,640     | 12     | 15,407    | 1,525     | 2,810   |             |         |
| Panama                          | 1      | 700       | 15     | 16,475    | 3,501     | 21,589  | 2           | 2,307   |
| Salvador                        | 4      | 8,897     | 6      | 9,008     | 2,564     | 4,794   |             |         |
| Mexico                          | 98     | 108,248   | 277    | 260,671   | 68,151    | 71,369  | 22          | 47,373  |
| Newfoundland and Labrador       |        |           | 6      | 9,585     | 1,405     | 3,316   |             |         |
| Barbados                        |        |           | 10     | 5,040     | 82        | 647     |             |         |
| Jamaica                         | 2      | 4,890     | 18     | 25,078    | 12,298    | 13,825  | 4           | 3,876   |
| Trinidad and Tobago             | 6      | 12,634    | 21     | 15,505    | 15,772    | 14,841  |             |         |
| Other British West Indies       |        |           | 4      | 1,950     | 1,858     | 1,031   |             |         |
| Cuba                            | 109    | 259,031   | 499    | 481,723   | 118,005   | 202,254 | 26          | 55,335  |
| Danish West Indies              |        |           | 1      | 1,250     | 286       | 963     |             |         |
| Dutch West Indies               |        |           | 2      | 966       | 817       | 217     |             |         |
| French West Indies              | 1      | 1,414     | 1      | 280       | 2,796     | 2,138   |             |         |
| Haiti                           |        |           | 6      | 4,932     | 2,056     | 8,073   |             |         |
| Dominican Republic              | 1      | 3,000     | 7      | 10,616    | 3,429     | 4,225   | 1           | 1,300   |
| Argentina                       | 3      | 3,651     | 234    | 307,882   | 518,019   | 41,266  | 113         | 72,979  |
| Bolivia                         | 2      | 4,500     | 4      | 5,000     | 128       | 2,250   | 1           | 1,800   |
| Brazil                          | 54     | 37,394    | 235    | 216,891   | 115,407   | 121,452 | 1           | 325     |
| Chile                           | 3      | 3,998     | 11     | 28,261    | 38,169    | 22,529  | 10          | 13,041  |
| Colombia                        | 3      | 7,375     | 46     | 72,596    | 13,036    | 14,223  |             |         |
| Ecuador                         |        |           |        |           | 1,403     | 490     |             |         |
| British Guiana                  | 2      | 1,500     | 2      | 1,462     | 4,156     | 1,462   |             |         |
| Dutch Guiana                    |        |           |        |           | 134       | 100     |             |         |
| Paraguay                        |        |           | 1      | 500       |           |         |             |         |
| Peru                            | 57     | 33,463    | 62     | 53,299    | 17,116    | 17,756  | 19          | 10,660  |
| Uruguay                         | 1      | 3,280     | 182    | 174,993   | 7,690     | 26,536  | 14          | 9,650   |
| Venezuela                       |        |           | 10     | 16,546    | 8,399     | 5,823   |             |         |
| Aden                            |        |           |        |           | 2,630     |         |             |         |
| China                           | 5      | 8,316     | 76     | 69,109    | 6,260     | 1,113   |             |         |
| Chosen                          |        |           |        |           | 2,054     | 145     |             |         |
| British India                   | 71     | 163,210   | 548    | 582,822   | 91,191    | 93,850  | 22          | 11,917  |
| Straits Settlements             | 2      | 3,832     | 59     | 60,701    | 6,250     | 75,387  |             |         |
| Other British East Indies       | 2      | 4,166     | 9      | 15,592    | 2,426     | 1,809   |             |         |
| Dutch East Indies               | 21     | 50,651    | 123    | 181,981   | 13,326    | 27,150  | 8           | 5,200   |
| French East Indies              |        |           |        |           | 291       |         |             |         |
| Hongkong                        |        |           | 8      | 8,639     | 861       | 738     |             |         |
| Japan                           | 45     | 38,715    | 147    | 132,714   | 29,488    | 4,353   | 3           | 6,785   |
| Persia                          |        |           | 1      | 575       |           |         |             |         |
| Russia in Asia                  | 7      | 20,565    |        |           | 3,025     |         |             |         |
| Siam                            |        |           |        |           | 789       |         |             |         |
| Turkey in Asia                  |        |           | 44     | 43,551    | 47        | 156     | 1           | 440     |
| Australia                       | 115    | 137,645   | 590    | 605,711   | 234,684   | 81,663  | 4           | 950     |
| New Zealand                     | 23     | 57,205    | 476    | 542,507   | 90,365    | 82,448  | 42          | 51,024  |
| Other British Oceania           | 4      | 4,163     | 3      | 2,040     | 300       |         |             |         |
| French Oceania                  |        |           |        |           | 693       | 813     |             |         |
| German Oceania                  |        |           |        |           | 300       | 1,029   |             |         |
| Philippine Islands              | 9      | 15,815    | 127    | 149,506   | 28,284    | 79,968  | 224         | 76,591  |
| Belgian Congo                   | 1      | 1,396     |        |           |           |         | 1           | 3,417   |
| British West Africa             | 25     | 40,321    | 52     | 56,266    | 15,774    | 6,592   |             |         |
| British South Africa            | 1      | 1,100     | 329    | 355,409   | 122,479   | 68,797  | 64          | 44,149  |
| British East Africa             |        |           | 20     | 22,937    | 4,246     | 1,080   | 4           | 6,885   |
| Canary Islands                  |        |           |        |           | 91        | 576     |             |         |
| French Africa                   | 3      | 1,511     | 57     | 43,132    | 9,611     | 8,325   | 175         | 154,530 |
| German Africa                   | 6      | 2,651     | 6      | 2,960     | 942       |         |             |         |
| Morocco                         |        |           | 36     | 42,715    | 11,538    |         | 20          | 10,224  |
| Portuguese Africa               |        |           | 4      | 4,765     |           | 150     |             |         |
| Egypt                           |        |           | 60     | 55,163    | 3,430     | 441     | 2           | 3,298   |
| Total                           | 1465   | 2,495,685 | 7213   | 8,012,973 | 4,996,638 |         |             |         |

## SHIPMENTS TO NON-CONTIGUOUS TERRITORY

|            |    |        |     |         |        |         |  |
|------------|----|--------|-----|---------|--------|---------|--|
| Alaska     | 1  | 1,000  | 1   | 70      | 2,133  |         |  |
| Hawaii     | 51 | 80,768 | 420 | 493,165 | 61,874 | 169,075 |  |
| Porto Rico | 17 | 54,396 | 57  | 81,739  | 35,969 | 51,840  |  |



## Belgium Holds First Automotive Exhibit

### British Lead in Motorcycle Show — New Brevets Spring Cycle Described

BRUSSELS, Feb 14—(*Special Correspondence*) — The Belgians' first show connected with the automotive industries is now being held in the Egmont Palace and is devoted to motorcycles and accessories. Foreign firms are in the immense majority, English makers being the most numerous, followed by Americans and Italians.

Belgian firms are devoting attention to the construction of motorcycles, as is shown by the appearance of two new concerns. The F. N. Company, which is the biggest motorcycle concern in Belgium, does not exhibit, although it is the intention of this company to turn out 15,000 motorcycles in 1920. The firm will build two models, a single and a four-cylinder, both of them with shaft drive. These are on the same general lines as before the war, but modified in detail.

Sarolea is in production on a single-cylinder 3½-hp. machine. Gillet is a new firm, controlled by engineers who were formerly with the F. N. They have produced a single cylinder two-stroke, the feature of which is the embodiment of a two-speed gear in the crankcase. This is ahead of the cylinder and gives a long belt drive to the rear wheel. The same firm also has in preparation a twin cylinder four-cycle machine with the same general type of change speed gear in the engine crankcase. For this construction the crankshaft is carried in ball bearings; roller bearings are used for the connecting rods, and shaft and rods are of BND alloy steel.

#### Brevets Cycle Is Show Feature

The machine which attracted most attention at the show was a new one built at Liege under the designation Brevets Spring. It is declared that the rights to build this have been secured by one of the most important motorcycle firms in England. The feature of this machine is the unit power plant on automobile lines. This comprises a twin cylinder air cooled V engine of 65 by 75 mm. bore and stroke, a disc clutch, three sliding gears, and bevel drive to a cross shaft. From this latter, power is transmitted to the rear wheel by means of a chain.

The crankcase comprises four separate castings. The lower portion is a single piece resting on and bolted to the cradle frame. It carries all the bearings and is intended to remain in position in the frame. On this lower base chamber is mounted the upper half of the engine crankcase, carrying the cylinders; a separate timing gear housing; and an independent aluminum housing covering the clutch and the gears. The clutch and gears can be completely exposed without taking the power plant out of the frame, by removing a few readily accessible bolts and disconnecting the

magneto. The cylinders can be taken off while the power plant is in position in the frame. The timing gear housing is removable without touching any other organ. Undoubtedly this is the most readily accessible motorcycle power plant ever put on the European market.

The Brevets Spring machine has been designed to be equipped with electric lighting. The electric generator, which will be positively driven, will be placed on the top of the gearbox housing and will be removed with this latter without having to break any connections. The storage battery will be carried just back of the main cradle frame.

#### Design Insures Stability

With the cylinders placed across the machine instead of fore and aft, the first draft of air comes on the valves and valve stems. There is a lateral frame on each side of the main frame carrying runningboards and leg guards. These latter are fitted with louvers for the passage of air and have opening for the passage of the exhaust pipe. The arrangement gives an independent pipe and an independent cut-out for each cylinder.

With this design the center of gravity is far forward. It is claimed, however, that with a rider on the saddle perfect weight distribution is obtained and that the stability of the machine is very much greater than on the usual types of machines with the greater proportion of the weight on the rear. The wheelbase is 59 in. The rear wheel is demountable on removing one bolt without disturbing the chain, sprocket or brake mechanism, thus enormously facilitating tire changing.

The saddle is carried on a frame consisting of a pair of semi-elliptic leaf springs. The rear mudguard and baggage carrier is a one-piece steel stamping with two tool boxes. Only the hinges of the doors are riveted to this. The whole is removable by detaching three winged nuts.

## F W D Takes Over Menominee Truck

MILWAUKEE, March 1—Stockholders in the F W D Automobile Co. of Clintonville, Wis., who recently acquired the principal interest in the Menominee Motor Truck Co. of Menominee, Mich., have taken over the entire ownership. For the present the F W D plant will be used, but later new buildings will be erected to accommodate the operation.

The Menominee truck will be continued in its present form, rounding out the F W D company's line of four-wheel-drive commercial cars and enabling it to offer through its present broad distributing organization a full line of trucks to suit any requirement.

A \$500,000 corporation has been organized in Wisconsin to take over the Menominee Motor Truck Co., a Michigan corporation. The present name will be retained, but the concern will be officered by present officers and directors of the F W D company.

## To Continue Trial of Schrader Firm

### Supreme Court Denies Demurrer in Trust Charges Against Manufacturer

WASHINGTON, March 2—The case of A. Schrader's Sons, Inc., charged with the violation of the Sherman Anti-Trust Act, was referred back to the Northern District Court of Ohio yesterday by the Supreme Court of the United States for further action.

The Schraders had been defendants in the Northern District Court on charges by the Government that they had violated the Sherman act in requiring tire manufacturers and jobbers to whom they sold their products "to execute uniform contracts concerning resales," and with "refusing to sell those who did not enter into such contracts and adhere to the uniform resale prices fixed."

The Supreme Court failed to sustain the demurrer granted by the Ohio district court, in which that court found that the Schraders had not entered into licensed agreements, but rather into selling agreements, and compared the Schrader company's case with the one in which Colgate & Co. were involved, where the Supreme Court found it was not a violation for manufacturers to inform their customers of their desire for price maintenance.

In the Schrader case the Supreme Court found there was no comparison with the case of Colgate & Co. It declared that there is a distinct difference between the manufacturer who displays a desire for price maintenance by request and one who maintains prices by obligatory agreements.

This action by the Supreme Court does not mean that it has found the Schraders guilty of violating the Sherman act, but merely that the demurrer based on a claim by the company was not allowed.

The Supreme Court, having passed on the interpretation of its Colgate decision, sends the Schrader case back to the Ohio court for completion.

#### SPIRO TAKES NEW PLANT

INDIANAPOLIS, March 2—The C. Spiro Manufacturing Co. of New York, makers of runningboards, robe and foot rails and other automobile equipment, will locate a branch factory in Indianapolis. A lease has been taken on the former Diamond Chain factory and operations are expected to begin April 1. George Spiro will be manager of the Indianapolis plant.

#### FRANKLIN OUTPUT, 16,000

ROCHESTER, N. Y., March 2—Production of Franklin cars in 1920 has been set by officials of the company at 16,000, an increase of 80 per cent over the output of 1919. The company is offering an additional \$1,000,000 of its 7 per cent cumulative preferred sinking fund stock at \$100 a share and accrued dividends.

## Motor Wheel Plans \$12,000,000 Business

Merged Companies Begin Operations Under New Control—  
Stock Offered at Par

LANISING, MICH., Feb. 28—Ratification of the merger plans for the Motor Wheel Corp., has been completed and the new corporation, capitalized at \$11,000,000, began operations this week. The merger included the Prudden Wheel Co., the Auto Wheel Co., the Gier Pressed Steel Co., and Weis & Lesh Manufacturing Co., of Memphis, Tenn. A price of \$25 bid and \$26 asked has been fixed to start trading in the new stock, which will be traded in on the curbs until it gets an official rating on the exchanges.

In the reissuance of stock Prudden Wheel is taken as a "bogie" at \$22.728 a share and stockholders of other companies receive shares in the new company in proportion to the book value of their holdings divided by the "bogie," Prudden stockholders getting share for share, Gier, with a book value of \$24.271, is exchanged on a 106.78 per cent basis. Auto Wheel, with a book value of \$18.028, on a 79.32 basis. Stockholders of Prudden Wheel will be allowed to buy the company's interest in Weis & Lesh at \$23, the price paid originally, and also will be allotted the subscription privilege of 7½ shares of Weis & Lesh. The latter stock is exchangeable on a basis of two for one, the book value being \$43.37.

Fractional shares in the new company will not be issued, holders of less than one share being paid at the rate of \$22.728 a share. Holders of a majority fraction have the option of purchasing a full share at the rate of \$22.72.

### Permanent Officers Named

Officers of the new corporation are William Newbrough, chairman of the board; Harry Harper, president; B. S. Gier, vice-president and treasurer; Drury L. Porter, vice-president; W. C. Brock, vice-president, and Clarence Carlton, secretary. The officers, with O. A. Jenison, Charles Nichols and Benjamin Seigfried, constitute the board. The National City Co., a subsidiary of the National City Bank, is behind the deal and will take part of the preferred stock.

Of the capitalization \$6,000,000 will be common and \$5,000,000 preferred. Transfer of stock of constituent companies will require \$3,001,084 of common stock leaving a surplus of \$3,000,000 unissued.

The combined balance sheet shows assets of the four companies \$8,881,027.18. A portion of the preferred stock will be sold to give ample working capital and clean up all outstanding obligations. The preferred probably will be 8 per cent and a sinking fund will be created to retire the issue. Common stock will be put on a quarterly dividend basis.

The three local concerns occupy virtually contiguous ground and the con-

solidation will prove of great benefit from a manufacturing standpoint. Auto Wheel will be equipped to make truck wheels and the lighter machinery placed in the Prudden factory for the manufacture of passenger car wheels. The Gier Co. is in position to handle the corporation's entrance into the steel wheel field and will be a feeder of various steel parts entering into wheel making. Weis & Lesh owns 25,000,000 ft. of timber five country mills and two spoke turning plants, with its own railroads into the supply fields.

### Plan \$12,000,000 Business

The combined sales of the four companies for 10 months in 1919 up to the period of their annual statements, of \$7,996,111.93 is an indication of the scope of their business. Inter-company sales in the same period aggregated \$639,637.38. Gross profits for the period were \$1,172,043.97 and federal taxes, \$329,273.23. Unfilled orders up to last Saturday were \$4,602,752.98, and contracts extend only to June 30, the companies making it a practice to insist on short time contracts with renewal on new price schedules on account of the market fluctuations. The first year's business of the new corporation is expected to approximate \$12,000,000.

Net assets of each company are: Prudden, \$3,408,701.62; Gier, \$1,896,180.12; Auto Wheel, \$648,179.47; Weis & Lesh, \$867,449.13. Each company's per cent of the total assets and shares in the corporation are: Prudden, 49.9776; Gier, 27.8009; Auto Wheel, 9.5033; Weis & Lesh, 12.7182.

Land, buildings and equipment of the merged companies are valued at \$4,603,191.18, investments, \$143,313.88, and current assets, \$4,054,222.93. Current liabilities are \$1,865,456.84 with stock issues and surplus of \$7,015,570.34. An item of \$239,280.33, for Weis & Lesh "good will" is not included in the figures.

### NEW PEERLESS PRICES

NEW YORK, Feb. 27—Increases in price of \$150 on open models and \$200 on inclosed cars is announced by the Peerless Motor Car Co. of Cleveland.

The increases are as follows:

|                              | 1920    | 1919    |
|------------------------------|---------|---------|
| 7-Passenger touring car..... | \$3,050 | \$2,900 |
| 4-Passenger roadster.....    | 3,050   | 2,900   |
| 4-Passenger coupe.....       | 3,700   | 3,500   |
| 7-Passenger sedan.....       | 3,900   | 3,700   |

### KISSEL OPENS SHOWROOM

HARTFORD, WIS., March 1—The Kissel Motor Car Co. of Hartford, Wis., is rebuilding the west end of its two-story main factory building into a new administration building, consolidating all executive departments, and providing on the second floor a palatial showroom for the display of a complete line of its passenger and commercial cars, parts, etc., for the benefit of distributors, dealers and other visitors to the plant. The space formerly was used by the upholstering shop, but during the war was turned over for extra office space and to quarter army officers on duty at the Kissel works.

## Want Commercial Attaches Retained

N.A.C.C. to Ask Congress to Restore Appropriation for Business Representatives Abroad

NEW YORK, March 2—Business interests of the United States, including the automobile industry, are condemning as "false economy" the recent action of the Appropriations Committee of the House of Representatives in cutting \$1,000,000 from the appropriation for the work of the Foreign and Domestic Commerce Department. A special committee of the National Trade Council will go to Washington next week to urge the retention of many features of the appropriation measure in which they are interested.

One of the acts of the appropriations committee which has met with particular opposition from the N. A. C. C., representing the automobile makers, is the cutting off of the commercial attaches in foreign countries. The plan under this arrangement is that all of this commercial work be done by the diplomatic representatives of the State Department.

The automobile industry contends that the matter cannot be handled on a satisfactory basis in this way, because the diplomatic representatives have to stay most of the time in one place, whereas the commercial attaches can move around and conduct commercial investigations which are of great value to the businessmen of the United States. This contention is pressed, also, by representatives of other American industries.

Al Reeves, general manager of the N. A. C. C., has characterized as "pink tea" business methods the plan for delegating to the diplomatic representatives the work formerly undertaken by commercial attaches. He points out that the N. A. C. C. is strongly for economy, but he and the people he represents believe that this move is false economy, and they are prepared to fight it vigorously.

### Would Expand Foreign Trade

Reeves pointed out that the foreign interests of the United States are such at the present time that they need expansion rather than contraction. The National Automobile Chamber of Commerce is recommending to its members that they set aside 10 per cent of their productions during the next year for foreign work in order that the automobile export business may be given proper stimulus.

Due to the pressure that is being brought to bear, it is believed that 90 per cent of the provisions cut from the commercial appropriations will be put back into the bill, but the big effort right now is to have the commercial attaches reinstated. If this provision is not included, each American manufacturer will have to send his own traveling men abroad to do the work that these commercial attaches are now doing. To develop a corps of men for foreign representation would take several years, manufacturers declare.



## British Tractor Report Resented

Advice to Purchasers to Seek  
Availability of Repair Parts,  
Called Unfair

LONDON, Feb. 13. (*Special correspondence*)—It is understood in trade circles that the Society of Motor Manufacturers and Traders, Ltd., after a conference with the Royal Agricultural Society, have decided to forego their arrangements for autumn tractor trials, thus leaving the field open wholly to the R. A. S. E. This action will meet with general approval as otherwise there would have been two independent tractor trials in the autumn, and it was obvious that one, if not both, would have been a loss to the promoters.

The recent report of the S. M. M. & T. trials at Lincoln has given offense to one, if not more, American entrants, because of there being appended to the Technical Advisor's report on some of the tractors, certain advice to would-be purchasers to inquire as to spare parts being available for the machine concerned.

It happened that one of the imported tractors thus pilloried by implication is the Emerson, and the importers, a prominent and up-to-date company, naturally resented the remark not merely as being offensive generally, but particularly so in their case as they had given the S. M. M. & T. explicit assurance on the point in reply to an inquiry.

Moreover, it happens that the Emerson is one of the oldest of imported tractors in Great Britain, and even before the present agents were appointed was handled by a highly respectable Lincolnshire firm of motor engineers, the directors of which are mostly farm experts, and therefore not likely to make the sort of mistake referred to.

## Government to Sell Metal Washing Soap

WASHINGTON, Feb. 28—The War Department authorizes publication of the following from the Office of the Director of Sales:

The Director of Sales announces that the Ordnance Salvage Board through the District Office, 19 Portland Street, Boston, is offering for sale by negotiation 150,500 lb. of soap powder, located at the plant of the U. S. Cartridge Co., Lowell, Mass., and 23,681 lb. of Fulling, solid soap, located at the plant of the Remington Arms U. M. C. Co., Swanton, Vt.

The soap powder, known as special cleanser No. 6, is a preparation used for washing metals. It is in good condition and is packed in 430 bbl. of approximately 350 lb. each. The Fulling soap is a similar preparation and was used for washing cartridge cases. It is packed in 76 bbl. of approximately 325 lb. each and is in good condition.

Offers for this material are requested. Prices should be quoted per pound f.o.b.

cars shipping point. Sale of this material will be made to the first bidder submitting a price satisfactory to the Government. Shipments will begin within ten days, in so far as possible, from the date of award and will continue thereafter as rapidly as facilities at the disposal of the Government will permit.

Inspection of the soap powder and soap may be made at the storage points. Further information relative to the materials and the terms of sale may be obtained from the Boston District Ordnance Office.

## Survey Louisiana in Campaign for Roads

NEW ORLEANS, Feb. 28—The Louisiana Motor League has started a survey of the roads of the State, preparatory to an intensive campaign for the \$25,000,000 to \$50,000,000 bond issued to be asked of the next session of the general assembly for the construction and maintenance of a system of good roads throughout Louisiana. Santley Lemarie, executive of the league, left New Orleans, Feb. 18., on a motor tour of every road in every one of the 63 parishes. His tour will cover approximately 7143 miles and will require between five and six months to complete.

Several national highways tap Louisiana, but there is not now, and never has been, connection between the roads within the State, such as they are, with these national roads, so that whatever improved highways exist within the State, begin nowhere and end in the same place, giving no connection with other states, or with good, all-the-year-'round exits from the State. This condition the motor league is trying to correct.

## BOSCH PLANS PRODUCTION

SPRINGFIELD, MASS., Feb. 28—By April 1 local officials of the American Bosch Magneto Corp. expect the maximum of 40,000 magnetos a month will be turned out. During January it turned out 32,000 magnetos, an increase of 500 per cent over January, 1919. George A. MacDonald of the corporation says no plans have yet been considered for enlargement of the plant here, although this spring it will be necessary to use all available space. Directors of the corporation had their quarterly meeting at Boston this week, declaring a quarterly dividend of \$2.50 per share on 80,000 shares, placing the stock on a dividend basis of \$10 per share. It previously had paid \$8 per share on 60,000 shares of stock outstanding. The annual report shows a final balance, after all charges and taxes have been paid, of \$15 per share and the earnings this year are expected to total \$20 per share.

## START J W P TIRE PLANT

INDIANAPOLIS, Feb. 28—The J W P Tire Co. has broken ground for its new factory at Scottsburg, Ind., to manufacture the J W P pneumatic tire. Scottsburg and Indianapolis men are directors of the concern. According to officials, the first unit of the factory will be ready for production within three months.

## Norway Considers Tire Legislation

Proposed Laws Would Require  
Pneumatics on All Trucks  
Up to 2-Ton Capacity

NEW YORK, March 1—Norway is the first country in the world to propose national legislation that will specify that motor trucks up to two tons capacity must be equipped with pneumatic tires so as to prevent damage to roads and to cut down the excessive cost of highway repairs due to the use of solid tires.

Cable advices to the Goodyear Tire & Rubber Co. indicate that the proposed legislation will be adopted in the near future. In fact, motor trucks shipped abroad by American manufacturers have already been refused admission because they did not conform to the new wheel and tire specifications.

All automobiles used for commercial purposes must be equipped with tires of at least five-inch tread on all four wheels. This means that up to two tons trucks must be pneumatically equipped; from two to three and a half tons either pneumatic or solid equipment of more than five-inch tires is permissible; while trucks of over three and a half tons weight may run on solids.

At present there is some doubt whether or not the new law will apply to city streets, pending legislation being particularly directed against the use of tires of less than five tread on country roads. The Norwegian Government estimates that unless action is taken to specify the sizes of tire widths, the country roads will be totally spoiled within two years.

The new legislation will affect motor truck manufacturers particularly, but in some cases the only change necessary in truck tire equipment will be greater tire width on front wheels—the rear wheels already complying with the provision of the new law.

It is expected that this legislation will be effective from the summer of 1920 onward.

## MOTORING GROWS IN CHINA

WASHINGTON, Feb. 28—Motoring is increasing rapidly in Peking, China, according to reports received by the Bureau of Foreign & Domestic Commerce from the Commercial Attaché at that point. Six hundred and fifty passenger cars, chiefly of American manufacture, are operated, of which 500 are owned by Chinese residents. A motor club has been formed to register chauffeurs and to influence road construction. It is expected that China's longest highway extending from Peking to Tientsin, 80 miles, will be completed within 10 months. Service stations are urged for China because native owners do not take the trouble to care for their machines properly. They do not bother with lubrication, spark plugs or other parts.

## Japan May Switch to European Cars

Consul Reports General Belief  
in Superiority of British-  
French Makes

WASHINGTON, March 1—Although 99 per cent of the motor vehicles imported into Japan in 1918 were of American manufacture, there is little question, according to Vice Consul E. R. Dickover, in a report to the Bureau of Foreign and Domestic Commerce, that the Japanese will undoubtedly purchase their high-priced cars from England and France as soon as they are available. This is due to the settled opinion that England and French cars are superior to those of American origin.

The demand for automobiles was at its highest in Japan when the armistice was signed, following which there was a business depression. Dealers had placed large orders in the United States and these were filled, leaving the dealers heavily stocked, and some of them for a time were unable to pay the customs duties, with the result that cars accumulated at the customs warehouses and some were sold by the authorities for charges. The remainder were gradually absorbed, however, or re-exported to Java, Shanghai, Straits Settlements and other Far East markets.

The market recovered and in the fall of 1919 automobiles were being imported from the United States at the rate of about 150 per month. The Japanese Government is granting bounties to encourage the use of motor trucks, but in spite of liberal concessions, truck operations have not increased rapidly except in Tokio and Magoya. The Japanese, however, are fully aware of the advantages of motor truck transport and are coming to the realization that good roads are essential for truck operation, and it is probable that the next few years will see great improvement in road construction in Japan.

Accurate statistics are not available as to the number of motorcycles in Japan. But based upon the approximate number in the Kobe consular district, the total for the Empire may be placed at somewhat more than 2000. The types in use are mostly of British and Japanese manufacture. American motorcycles are usually too large and heavy for the Japanese to use, and the high-speed types popular in America are not practicable for the roads in Japan, which rarely permit a speed of more than 20 miles an hour.

### BUILDS CANADIAN TRUCK

MONTREAL, March 1—Eastern Canada Motor Truck Co., Ltd., has just completed its factory building in Hull, Que., and expects to have its first trucks ready before the middle of February. The company is entirely Canadian and financed by Canadian capital. The officers are as follows: President, A. K. MacCarthy; vice-president and general manager, G. Gordon Bell; secretary-

treasurer, T. W. MacDowell; sales manager, J. M. Taylor. The directors of the company are T. F. Ahearn, F. E. Bronson, G. S. MacCarthy and Thomas Arnold.

The company is specializing for this season on a 2-ton model called the Veteran truck, although they are equipped to handle orders for larger sizes. The company's engineers have had years of experience in United States truck factories, supplemented by experience in France and Gallipoli with transports where practically every make of truck was represented and studied under the severest working conditions.

### MAGNET TRACTOR SHOWN

MINNEAPOLIS, MINN., Feb. 28—A new accession to the farm tractor industry in this city is the Magnet Tractor Co. which made the first public display of its proposed products at the recent Minneapolis show. It is a Minnesota corporation with an authorized capital stock of \$500,000. R. A. Jacobson is president; M. T. Bentzen, vice-president, and Einar Hoidale, secretary and treasurer. The company built a couple of experimental models at the shop of the Lund Machine Co. It is occupying offices at Second Avenue South and Sixth Street and is having a single story 90 by 205 ft. brick factory erected for it at Central Avenue and Eighteenth Street, N. W. The tractor is a three-plow machine with Waukesha  $4\frac{1}{2} \times 6\frac{1}{4}$  in. engine, special transmission and a worm and wheel final drive. A full description will appear in an early issue of AUTOMOTIVE INDUSTRIES.

## Lawson to Build 20 Passenger Planes

Milwaukee Company Starts Work  
on Giant Biplanes for Trans-  
continental Flights

MILWAUKEE, March 1—The Lawson Air Transportation Co. of Milwaukee, which recently achieved historically notable success in negotiating a trip from Milwaukee to New York and Washington and return in a giant biplane carrying 20 passengers, has announced the completion of plans for the construction of twenty planes of the same type which will be put into transcontinental service during 1920 and succeeding years. Four ships are now under construction at the new plant in South Milwaukee.

Contracts have been placed for 100 Liberty-type engines, more than half of which will be delivered by May 1. It is said the new Lawson planes will be equipped with three or four engines, instead of two, as in the pioneer machine. Enough spruce, aluminum, steel, linen and other materials and supplies for twenty ships also have been contracted for.

### TWIN ENERGY TO BUILD

ALBANY, N. Y., Feb. 28—Plans for the construction of a new \$1,000,000 factory to be built in Albany by the Twin Energy Motors Co. are being prepared. A site for the new plant has been chosen and building work will be started in the spring.

### Does the Work of 750 Snow-shovelers



New York tried out a new device for removing snow recently. It is the invention of Dr. Samuel Friedman. A system of conveyors picks up the snow and deposits it in a receptacle having a capacity of 10 cu. yd. When the container is filled, a door at either side is lowered, a lever pulled, and the snow is dumped into a truck alongside. It is claimed by the inventor that the machine will replace 750 laborers. The above illustration shows the snow-tank at work.



## New Rail Bill Will Help Motor Trade

N. A. C. C., in Bulletin, Indorses  
Railway Association Plans for  
Car Distribution

NEW YORK, Feb. 28—The interests of motor car manufacturers in the important matter of car service are well provided for in the proposed railroad bill and in the plans of the American Railway Association, says the National Automobile Chamber of Commerce, in a recent bulletin. A representative of the Chamber was in Washington last week discussing plans for handling automobile cars with the car service section of the American Railway Association.

The N. A. C. C. bulletin points out that after March 1 the initiative lies first with the individual lines and secondly with the Interstate Commerce Commission to arrange proper car service rules and agreements. To accomplish this the American Railway Association is deciding to continue the car service section of the United States Railroad Administration at Washington. This will consist of five members, and in the opinion of the N. A. C. C., the personnel will be about the same as at present. Individual railroads are to sign agreements giving plenary power to the commission as to the general control and distribution of cars or any particular group of cars.

For some time the Chamber has been urging the railroads when they go back to private control to make proper provisions for handling automobile traffic. As the Chamber is constantly in touch with the car service section regarding the handling of automobile cars under this plan, they have agreed to a conference with the Chamber on details at an early date. In the event of insufficient or unfair handling or distribution of cars by the railroads, shippers, under the terms of the new railroad bill, may appeal to the Interstate Commerce Commission, which is given full authority over these matters.

## Coast Wants System of Military Highways

WASHINGTON, Feb. 27—The maintenance of a national system of motor truck defense and the establishment of military highways in Washington, Oregon and California for the use of heavy motor transport and for the protection of the Pacific Coast, as well as for commercial purposes, is authorized by a bill introduced into the House by Congressman Raker. The bill authorizes the War Department to make an examination and report. It would establish three motor transport trunk lines to be known as the Coast Highway, or first line of defense; the Valley Highway, or second line of defense; the Mountain Highway, or third line of defense.

These highways, together with laterals, are to be included in a system of motor truck transport highways and

post roads. The Coast Highway is to be located at a prudent distance from the Pacific Coast shore, shielded by hills, extending from Port Angeles, Wash., to San Diego, Cal. The Valley Highway, or second line of defense, is to extend from Blaine, Wash., to Calexico, Mexico, and the third highway from Oroville, Wash., to Eureka, Cal., where it will connect with the Coast Highway.

Laterals are to extend eastward from every important harbor to intersect the three highways and the important passes in the mountains. The Office of Public Roads, Department of Agriculture, is to co-operate with the Secretary of War in the survey of these roads, and the sum of \$250,000 is appropriated by the bill to bear the expense of making the survey and report.

## City Presents Factory

OTTUMWA, IOWA, Feb. 28—The Iowa Motor Truck Co., manufacturer of the Bell truck, has recently been made a present of a building by the City of Ottumwa. The building was built a few years ago for a manufacturing concern which did not succeed and to make Ottumwa attractive to Bell and his associates the city made them a present of the building, conditional upon the company remaining in Ottumwa for a specified number of years, and maintaining a certain pay roll. The building is two-story, 300 x 225, with two storage buildings, and is located on trackage. It will greatly increase facilities, and the Iowa Motor Truck Co. expects to put out 1000 trucks in 1920. A considerable portion of the output for the past year has gone to the beet growers of the West.

## BUYS GOODYEAR "BLIMP"

KANSAS CITY, Feb. 28—Kansas City has purchased the first lighter-than-air craft produced for commercial purposes by the Goodyear Tire & Rubber Co. The Commercial Airship Syndicate of this city is the purchaser and the syndicate expects to put the new craft into operation for commercial aerial transportation by April 1.

The craft is the "Baby Blimp" which has been shown in several air shows in the United States, its first exhibition being at the Chicago show. It is 95 ft. long, 40 ft. high and 28 ft. in diameter and has a gas capacity of 35,000 cu. ft. Its motive power is a 40-hp., 16-valve, four-cylinder engine which will drive it at 40 m.p.h. and its range is about 400 miles and its ceiling 6000 feet.

## COMET PRICES RISE

DECATUR, ILL., Feb. 27—The Comet Automobile Co. has increased prices on the Comet Six, Model C-53 passenger car, from \$2,150 to \$2,350 and on the Comet 1½-ton triple tread worm drive truck from \$1,750 to \$1,950.

## Trinidad Offers Market for Cars

Prosperous Conditions Due to  
High Prices Creates Motor  
Vehicle Demand

WASHINGTON, Feb. 28—The prosperity of merchants and planters in Trinidad and Tobago due to high prices for sugar, cocoa and cocoanuts, and the boom in the oil industry has increased the possible automobile market, according to a report received by the Bureau of Foreign and Domestic Commerce at Washington.

At the close of 1919 there were 1132 motor vehicles registered, a gain of several hundred within the year. Practically all of the cars used are of American manufacture. The roads of Trinidad are exceptionally good, due to the famous lake of asphalt on the island, which supplies asphalt for road construction. Six hundred miles of highways in Trinidad are suitable for motoring.

There has lately been an increasing demand in Trinidad for motor trucks for commercial purposes, and the more such trucks come into the market here and their economic usefulness is demonstrated the more are orders given for their importation from the United States. But it has been difficult for local agents to get orders filled by American manufacturers, who seem too busy with their home market to trouble with this export trade, and the demand has been partly met by building motor truck bodies on second-hand chassis. It is understood that about forty or fifty motor trucks are under order for Trinidad from the United States. When these arrive the existing number of motor trucks in this colony will probably be about double.

One-ton trucks find a very important use here in hauling cocoa from the estates to the railway stations. Also some of the large merchants are now using 1-ton trucks with imported bodies for store deliveries, for the trucks used for conveying of cocoa the bodies can be made locally, but there is a tendency to make them unnecessarily heavy in proportion to the strength required for the work.

## Oil Companies Use Trucks

The local companies engaged in the production of mineral oil are now using 2½-ton, 3-ton and 3½-ton trucks for hauling pipes and heavy machinery. There is also some use of caterpillar tractors with trailers for such purpose. One-ton trucks cost in Trinidad about \$900, 2-ton trucks, \$3,500, 2½-ton trucks, \$4,000 and 3-ton trucks, \$4,500 and upward.

The duty on motor cars and motor vehicles entering Trinidad is 8 per cent ad valorem, British preferential tariff, and 10 per cent ad valorem, general tariff. Locally produced gasoline is used. By agreement among producers it is sold at 48 cents per imperial gallon (1.2 gal.).

## Michelin Acts to Safeguard Patents

### Steel Disk Wheel Rights in America Sold to Budd Wheel Corporation

PARIS, Feb. 12 (*Special correspondence*)—Michelin steel disk wheels are fully covered by patents, and these patent rights will be upheld in America, declared André Michelin in a conversation to-day.

Michelin stated emphatically that there was no doubt about the validity of his patents covering steel disk wheel construction. Instead of waiting for rivals to attack his patents it is quite probable, he declared, that the Michelin company will take the initiative of protecting its patent rights.

The Michelin steel disk wheel was brought out a considerable time before the war, and was in active production throughout the whole of the war for light trucks and for touring cars. On a moderate estimate, 60 per cent of the French passenger cars to be produced this year will be equipped with Michelin steel disk wheels. In addition to this, large numbers of trucks are being fitted with these wheels.

There is a growing tendency in France to make use of the big dual tires for trucks up to 3-ton capacity, and for this work the Michelin wheel is used exclusively. The first application of the Michelin wheel was on the cheaper grades of cars. It is now being adopted by manufacturers of high-class cars. As an indication, it is declared that the Rolls-Royce Co. has placed an important contract for this type of wheel.

Michelin is building this wheel in France, in his own factories or under his own supervision. In America the rights have been sold to the Budd Wheel Corp. of Philadelphia. Arrangements are being made to manufacture the wheel in England for the British market.

## New Syndicate Takes Over Rochester Motors

NEW YORK, Feb. 28.—The Rochester Motors Corp. has been organized by a syndicate headed by Symington, Hoffman & Co., New York, to produce motor car engines on a large scale. They have acquired the business assets of the Rochester Motors Co., Inc. The new corporation will complete contracts held by the Rochester Motors Co., Inc., for the production of the Rochester-Duesenberg four-cylinder engine. The large addition to the factory at Rochester started last fall will be rushed to completion and new machinery for increased production will be placed as soon as possible.

Although orders on hand preclude the possibility of Rochester Motors accepting new business for delivery in 1920, they are already mapping out a greatly enlarged program of production for 1921.

A New York executive office will be opened shortly. The personnel of Roch-

ester Motors consists of the following: President, Donald Symington of Symington, Hoffman & Co.; vice-president, in charge of manufacturing, Charles F. Morley, head of the Morley Machinery Corp.; vice-president, in charge of engineering, Fred C. Kimmel, formerly president of the Rochester Motors Co., Inc.; vice-president, in charge of sales and advertising, Nicholas G. Rost, formerly general salesmanager of the Duesenberg Motors Corp.; treasurer, Edward F. Davison, formerly treasurer of the Rochester Motors Co., Inc.

## Harley-Davidson Sets Mile Record at 32.45

DAYTONA BEACH, FLA., Feb. 28.—World's records for motorcycle speed were established here by Leslie Parkhurst on a Harley-Davidson, when he traveled a mile in 32.45 seconds on a machine with 68 cu. in. piston displacement. With a sidecar passenger he traveled a mile in 41.16 seconds in a machine of the same piston displacement. The Warner electric timing device officially approved by the A. A. A. was used in the timing. R. A. Leavell, A. A. A. referee, was in charge of the trials; C. A. Verschoor, official judge, and William Young, police chief of Daytona Beach, clerk of the course. The beach through the trials was in comparatively poor condition as a result of high tides. Parkhurst and other racers estimated a loss of two seconds to the mile because of the heavy condition of the course.

## Italy Opens Tourney for Small Planes

PARIS, Feb. 4 (*Special correspondence*)—A competition has been opened in Italy by the National Aerial League for small single or two-passenger airplanes, having a low cost of maintenance. In this competition, which will be held during the coming summer, there will be two distinct classes: machines having engines not exceeding 213 cu. in. capacity and 305 cu. in. respectively.

Two machines which fly with one passenger, with less than 30 hp. have been built in Italy. These are the Macchi and Pensutino. The latter was built by one of the engineers of the Caproni Co.

## BUSES IN BUENOS AIRES

NEW ORLEANS, Feb. 28.—According to information reaching the Argentine consul-general in this city, concessions have just been granted to a corporation in Buenos Aires to operate four lines of buses between the heart of the city and the suburban residential districts. One hundred buses, 25 to each line, have been installed, and the fare is 10 cents each way, the same as charged by the street railway companies. The concession is for 50 years, after which it reverts to the city, or can be renewed, as the municipal government prefers. The Commission of Public Works is to be at all times in control of the lines, which must maintain permanent service of at least 90 vehicles.

## Would Create Truck Highway System

### Congress Gets Bill Proposing System of Specially Con- structed Truck Roads

WASHINGTON, Feb. 28.—The creation of a national department of highways to be known as the Department of Highways, to construct and maintain a national system of motor truck highways, would be authorized by a bill introduced into the House by Congressman Raker. The term motor truck highways would mean roads with strength and capacity adapted to use by motor trucks engaged in transportation of heavy burdens and it would be a system free from toll charges. The purpose of this act is to allay motor truck highways with the general national highway system already authorized by a bill introduced earlier by Congressman Raker and providing for the establishment of a Department of Highways.

The bill authorizes the construction and maintenance of national highways by the national Government, with expenses borne by the Government, although the work of construction and maintenance shall be done through the state highway authorities under the general supervision of the Department of Highways.

The bill divides the nation into ten regional highway areas, authorizing the secretary over the Department of Highways to be appointed by the President, and a body of National Highway Commissioners, ten in number, representing agriculture, commerce, development of native resources, education and economics, manufacture, military engineering, motor truck transport, motor car travel and touring.

The remainder of the bill is practically the same as the earlier bill introduced by Congressman Raker and described in a previous issue of AUTOMOTIVE INDUSTRIES, containing in detail instructions for co-operation with Governors of states by the Secretary of the Department of Highways and granting him the necessary power to take over the office of Public Roads, together with its personnel, equipment, material and supplies.

The bill also appropriates \$25,000 for each square mile unit where the average population is less than the national average population for road construction aside from the Federal-aid appropriations, making these appropriations, which are to be known as equity population allowances, payable in five years in five equal amounts. The bill would appropriate \$10,000,000 to carry out its provisions.

## BERGOUNGAN PRICES RISE

TRENTON, Feb. 28.—Increases of about 5 per cent on all tires and tubes above 30x3½ size have been announced by the Bergougnan Rubber Co., effective March 1. In the 34x4 class plain fabric tires will advance from \$36.50 to \$37.95. The non-skids at \$39.75 to \$41.75. Cords \$53 to \$55.50, and tubes \$5.85 to \$6.15.



## Tractor Show Board Fixes Regulations

**Closes List of Sanctioned Shows  
and Exhibitions Up to  
May 15**

CHICAGO, Feb. 28—At a meeting of the National Tractor Demonstration and Show Committee of the Tractor and Thresher Department held in Kansas City, the following action was taken:

"It is the sense of this committee and its representatives, acting under rule four, that no demonstrations held by agricultural colleges or others will be approved excepting those permitted under rule three.

"That this committee will not approve any shows of tractors or tractor drawn or driven machinery held in connection with or under the auspices of retail dealers' associations or thresherman's associations.

"That it is the sense of the committee that any dealer handling or acting as agent for more than one make of tractor and desiring to hold a demonstration or school confined to the makes of tractors he handles shall not be deemed a violator of the rules of this committee, nor shall the manufacturer furnishing tractors to said dealer be construed as a violator of the rules, even though he may furnish expert help for the demonstration or school, same being purely for the purpose of seeing that his machines are properly demonstrated.

"That it is the opinion of the committee that by the term 'purely local in character' used in rule three, the committee understands and rules that this applies to demonstrations which draw or are intended to draw their attendance from the county in which the demonstration is held, or the equivalent in area, but not to exceed the territory actually tributary in the retail trade to the place where the demonstration is held.

"That a demonstration of tractors or tractor drawn or driven machinery in road making is construed by the committee as being the same thing as a 'public field exhibition' as mentioned in rule one, and a combination of plowing demonstration and road making demonstration or other uses of tractor power on different days of the same week and under the same management is deemed by the committee to be a demonstration of more than one day and comes under rule four.

"That no more demonstrations or shows, to be held prior to May 15, 1920, be approved by the committee.

"That all applications for shows national in character be considered at the next meeting of the committee."

### GARTLEY-WESTON COMBINE

DETROIT, Feb. 27—Gartley-Weston Co. of Detroit, and the Doherty Metal Plating Co. of Detroit and Sarnia, Ont., have been amalgamated, and both companies now are operating as the Gartley-Weston Co., Inc. The company is incorporated under the laws of Michi-

gan for \$300,000. R. I. Towers of Sarnia is president; P. C. Gartley of Detroit, vice-president and director of sales and advertising; Malcolm MacKenzie of Detroit and Sarnia, vice-president and treasurer; Frank J. Weston of Detroit, secretary, and James F. Perkins of Detroit, production engineer. The company for the time being will devote its energies to the manufacture and sale of Weston auxiliary windshield wings, tonneau wings and direction indicators.

### To Fish with Planes

WASHINGTON, Feb. 28—The Bureau of Fisheries plans to use aircraft in aiding tuna and sardine fishermen in finding schools of fish, according to announcement by the Bureau to-day.

Recent experiments with naval seaplanes off the California coast, undertaken with the authority of the Navy Department, have shown the possibilities of "fishing with planes," the Bureau announced, and the continuance and perfection of this service have been the subject of conferences between the Bureau and the Navy Department.

### Tractor Must Deliver Power, Court Decides

CALGARY, ALTA., Mar. 1—According to a decision which has been handed down by the privy council it is incumbent on machine companies when selling tractors of a certain horsepower to deliver tractors actually having that horsepower. This was announced as the finding of the council for the Grain Growers in the Emerson-Brantingham Implement Company appeal against the Grain Growers' Association on which case C. E. Gregory, K.C., counsel for the Grain Growers has been in England since the early part of October.

The effect of the privy council's decision is also to give the purchaser of such machine the right to bring action at any time he discovers a deficiency of horsepower.

### ROAD ASSOCIATION MEETS

MILWAUKEE, Feb. 28—The Good Roads Association of Wisconsin, at its annual meeting at Madison, elected C. C. Jacobus, member of the Milwaukee county board of supervisors, as president; Elmer S. Hall, Green Bay, was elected vice-president; E. J. Perry, Fond du Lac, treasurer; William H. Reese, salesman Sterling Motor Truck Co., Milwaukee, secretary. Francis A. Cannon was reappointed executive secretary and manager. As customary, the association held its annual convention at the same time as the yearly "good roads school" conducted by the Wisconsin State Highway Commission for county highway commissioners and their subordinates. The county commissioners maintain a distinct organization, which co-operates thoroughly with the commission.

## British Airway to Link South America

**Lays Out Route from Pernambuco to Buenos Aires Covering 2600 Miles**

WASHINGTON, Feb. 28—An all-British "airway" contract in South America has been completed, according to information received in this country from the American Consulate General at London. The route extends for 2600 miles, with twelve air ports en route, and runs from Pernambuco to Buenos Aires. It appears that keen competition was met with in obtaining this airmail route contract.

According to particulars now for the first time published "the aim in planning the route has been to link all towns of importance with two terminal airdromes. Through dividing the route into fairly easy stages, the airplanes are not required to carry heavy loads of fuel, leaving more capacity for cargo." The total flight is carried out in eleven stages:

|  | Miles |
|--|-------|
| Pernambuco to Macelo (Brazil).....             | 125   |
| Macelo to Bahia.....                           | 281   |
| Bahia to Caravellas.....                       | 325   |
| Caravellas to Victoria.....                    | 191   |
| Victoria to Rio de Janeiro.....                | 281   |
| Rio de Janeiro to Sao Paulo.....               | 234   |
| Sao Paulo to Florianapolis.....                | 319   |
| Florianapolis to Porto Alegre.....             | 250   |
| Porto Alegre to Pelotas.....                   | 176   |
| Pelotas to Montevideo (Uruguay).....           | 297   |
| Montevideo to Buenos Aires<br>(Argentina)..... | 125   |

At first only daylight flying will be carried on. From start to final destination three days will be occupied, passengers having, therefore, to arrange for accommodation at night, and such halts will be at Bahia, Rio de Janeiro and Porto Alegre. This length of time (three days) will mean a saving of six days, compared with the mail boat, but as soon as night flying is undertaken the whole journey will average about 39 hrs. The fee for letters from end to end of the route will not exceed 73 cents.

### CHAMPION ENTERS CANADA

DETROIT, Feb. 27—Champion Spark Plug Co. of Toledo is erecting a large plant in Windsor, Ont., which is expected to have a production capacity of 35,000 plugs daily. The plant is expected to be in operation early in the summer.

The new building will contain 15,840 sq. ft. of floor space and will be the largest spark plug plant in the Dominion. The Champion Spark Plug Co. of Canada, Ltd., is the name of the Canadian branch.

### FORM NEW TRUCK COMPANY

COOPERSVILLE, MICH., Feb. 28—John H. Toravert will head a new organization here to build automobile trucks, bodies and cabs. A site has been selected and a building 50 x 100 ft. will be erected immediately. Other officers are: L. J. Hinken, vice-president; William Van Allsburg, secretary-treasurer, and Millard Bush, manager.

## To Make American Goods in Europe

### British-American Industries, Ltd., Formed to Promote Manufacturing Abroad

LONDON, Feb. 6 (*Special Correspondence*)—The American Chamber of Commerce in London says that a new company, known as British-American Industries, Ltd., has been formed to arrange the manufacture of American goods in Great Britain for British and Empire markets.

With the growth of the movement for preferential tariffs and other preferential arrangements among the countries making up the British Empire, many American manufacturers already have considered it desirable to establish factories in Canada. The new company is working, however, on the presumption that the advantages of a factory in Great Britain are infinitely greater for the following reasons:

The British home market is a larger one, and is better situated for export trade, first, on account of steamship facilities to all parts of the world, and, second, because London is the financial center of the Empire and handles a large percentage of the colonial trade; insurances are more easily effected in London; colonial buyers visit London more readily than Canada. British labor, in spite of its unrest at the present time, is still understood to be cheaper and more plentiful than in Canada.

The American Chamber in London understands that the new company will encourage and assist American manufacturers of successful commodities to put down plants in Great Britain, but where the American manufacturer is not interested in doing so and is willing to sell his manufacturing rights the new company will undertake to find British or French manufacturers who will take over those rights. Similarly, it will introduce into America goods which have proved successful in Great Britain or France.

## Trade Opportunities in Foreign Markets

WASHINGTON, March 1—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity number.

An automobile dealer in Spain desires to purchase and secure agencies for the sale of automobiles and accessories. Quotations should be given c.i.f. Spanish port. Correspondence should be in Spanish. References. 32122.

An agency is desired by a merchant in Algeria for the sale of tractors. Quotations should be given c.i.f. Oran. Pay-

ment against documents. Correspondence should be in French or Spanish. Reference.

A mechanical engineer from Switzerland has been in the United States for some time; is now about to return to Switzerland, and desires to secure an agency for the sale of automobiles and accessories and tires. References. 32138.

A provincial government in Canada is to expend about \$500,000 during the next two years for road-making machinery, motor trucks, trailers, etc. American firms desiring to bid on these supplies should immediately get in touch with the government engineer. 32103.

A plantation owner in Guatemala desires to purchase two small tractors with trailers. Quotations should be given f.o.b. Atlantic port. Payment, cash against documents. Correspondence may be in English. Reference. 32110.

## Financial Notes

Packard Motor Car Co. has declared a regular quarterly dividend of 1½ per cent on preferred stock, payable March 15, to stockholders of record Feb. 29.

American Rubber & Tire Co. stockholders voted last week to increase the capital from \$675,000 to \$4,000,000, one-half to be common and one-half first preferred, 8 per cent cumulative stock. The company's statement shows an increase of 128 per cent in net sales over 1918.

Detroit Steel Products Co., in its report for the year ending Dec. 31, filed with the Detroit Stock Exchange, reports assets aggregating \$4,155,930.66 with current assets of \$3,132,206.11. Current liabilities of \$1,444,655.20, and a surplus of \$1,527,062.13.

Wichita Falls Motors Co., Wichita Falls, Tex., has increased its capital stock from \$800,000 to \$1,800,000, all of the new issue being taken by stockholders.

Auto Parts Corp. annual report for 1919 shows a balance of net earnings, after deduction of dividends and taxes, equivalent to \$1.85 a share on the \$4,029,569 of outstanding common stock of \$50 par value. The report shows total assets of \$7,177,026 and a surplus of \$273,741.

Selden Truck Corp. will pay dividends of 2 per cent on the first preferred stock April 1, and the regular quarterly dividend of 2½ per cent on the second preferred stock will be paid at the same time to stock of record March 16.

Reynolds Machine Co., manufacturer of automatic screw driving machinery, has increased its capitalization from \$200,000 to \$500,000, and is preparing to enter the manufacture of tire molds and equipments.

The Mason Tire & Rubber Co., Kent, Ohio, is offering for sale a quantity of both preferred and common stock in the corporation, which recently was re-incorporated with a capital of \$7,500,000.

## Companies Plan Marysville Plants

### New Wills-Lee City of 60,000 Population Attracts Manufacturers

DETROIT, Feb. 27—John R. Lee, associated with C. Harold Wills in the new corporation which will produce a high-class automobile in a plant being erected at Marysville, Mich., gave details of the plans for creating a city of 60,000 in a court proceeding in Port Huron, this week. The statement is important in that it reveals the names of several of the parts manufacturers who will establish large plants in the new city. Lee announced that he would prefer to withhold the names of three or four others who will erect factories in Marysville.

The General Aluminum & Brass Co. already has bought a plant in South Port Huron and contracts have been let for its plant in Marysville, railroad sidings for which have been laid. The Marysville plant of the General Aluminum Co. will occupy a 30-acre site.

The Detroit Gear & Machine Co. will erect a big plant near the site of the Wills-Lee factory and the Canadian Brass & Metals Co. has an immense plant well advanced.

Adjoining the General Aluminum site the Athol Manufacturing Co., of Athol, Mass., manufacturers of rubber cloth and other materials for automobile tops, has secured a large site and started plant construction, and the Williams Co., of Alliance, Ohio, one of the large producers of drop forgings in the United States, has begun construction of a \$1,000,000 factory.

The Wills-Lee Corporation has foundations in for five new factory buildings, which will be ready for occupancy April 1, furnishing 150,000 sq. ft. of working space. Three units of the larger four-story factory will be built this spring, adding 1,250,000 sq. ft. of floor space. The company expects to have 2500 men at work Sept. 1, and 7000 a year from now. The city is now being laid out and houses rapidly are being erected to accommodate employees and their families.

The United States Steel Corporation, it is said, will erect a blast furnace and sheet mill near the site, though no confirmation of this report is obtainable.

## HAYES SALES \$14,686,383

JACKSON, MICH., Feb. 27—Hayes Wheel Co. reports net sales last year of \$14,686,383.16, approximately double the total for 1918. A total of 956,991 sets of wheels were shipped during the year. The production program for 1920 representing approximately \$30,000,000 in sales is planned.

The company paid dividends last year amounting to \$125,999.40, and Federal taxes of \$610,000, leaving a balance of \$765,565.45 net profit for the year. This added to the surplus made the amount on hand Jan. 1, 1920, \$1,599,340.74.



## Fisher Gets Plans for Cleveland Plant

CLEVELAND, Feb. 28—The architects' plans for the new factory to be built in this city by the Fisher Body Co. have been completed. The structure will be one of the largest one-unit plants in America. It will be six stories in height, have 1,500,000 sq. ft. of floor space and will extend along Coit Road 1300 ft. and 700 ft. along East 140th Street. The cost of constructing the new building alone will approximate \$500,000.

The plant will have a frontage on the New York Central and New York Belt Line railroads. Power plants, dry kilns and other equipment necessary to the equipment of the factory will be constructed on the tract, which consists of 40 acres.

The plans are in the hands of contractors, and bids will be submitted within two weeks. Some of the steel contracts already have been awarded and fabrication has been going on for some time. Other materials have been obtained by contracts as a matter of protection against advancing prices, with the result that considerable money has been saved.

The plant will have a frontage of 2350 ft., or nearly half a mile. The part which is to be used for the body plant will be 72 ft. deep and that for the paint shop 120 ft. deep.

## FORM NEW FORGE COMPANY

MILWAUKEE, Feb. 28—The development of Milwaukee as the greatest producing center of automotive parts and materials in the entire United States has brought into being a new drop forge enterprise of large proportions. It is the Interstate Drop Forge Co., which has been incorporated for \$250,000 by Maj. Sherman M. McFedries, 624 Shepard Avenue, who served in the Ordnance Corps during the war. Contracts were awarded during the week for the first units of the new plant at Hopkins and Thirty-third Streets, consisting of a forge shop, 100 x 150 ft., and a machine shop, 75 x 100 ft.

## AUSTIN LEASES PLANT

GRAND RAPIDS, MICH., Feb. 28—Austin Automobile Co. has leased a four-story building and will occupy it as an addition to the present plant as soon as alterations can be made. The new factory will give the company largely increased capacity and it will start with orders sufficient to keep the plant busy for several months. The Austin company has its parts manufactured at various places, under contracts, and assembles them in Grand Rapids.

## CANADIAN PLANT OPENS

OSHAWA, ONT., March 2—The new plant of Olds Motor Works, Ltd., of Canada, a General Motors subsidiary, began operations March 1. Canadian requirements for Oldsmobile trucks and passenger cars will be filled by this plant. It is planned to produce 5000 trucks and cars the first year.

## Current News of Factories

*Notes of New Plants—  
Old Ones Enlarged*

## Stockholders Plan

### Purchase of Fulton

NEW YORK, Feb. 28—It is understood that stockholders of the Fulton Motor Truck Co., which is to be sold at auction by John S. Sheppard, receiver, at Farmingdale, L. I., on March 11, have completed plans for the purchase of the business at the sale and the reorganization of the company.

A man who has been president of a large truck company in the Middle West, whose name is withheld for the present, is said to have announced his willingness to subscribe heavily toward buying the business at the sale. He is slated for the presidency in the reorganization scheme.

Frederick Flynn, of New York, who is acting as trustee for the funds and is working in the interest of the stockholders through the Fulton Stockholders' Protective Committee, is authority for the statement that the property will be purchased by them.

The reorganization plan contemplates the incorporation of the Fulton Motors Corp. in Delaware with \$150,000 capital Class A shares of \$10 par stock and 350,000 Class B shares without par value.

J. E. Conant & Co., Lowell, Mass., has arranged to hold the sale at the plant at 12.30 p. m. Thursday, March 11, in accordance with the decree of sale issued by Judge Learned Hand Jan. 28.

## MILWAUKEE FOUNDRY BUILDS

WAUKESHA, WIS., March 1—To meet greatly increasing demands for brass and bronze castings and parts from the automotive industries, the Waukesha, Wis., Brass Foundry Co. has purchased a tract, 170 x 300 ft., and will build a complete new shop group costing about \$100,000 when completed. It will be built in two units, ground for the first being broken to-day. The presence in Waukesha of several large automotive plants furnishes a material home consumption.

## TO EXTEND FABRIC PLANT

SHERBROOKE, QUE., March 1—Financial arrangements are now being made through the sale of \$3,000,000 of 8 per cent cumulative preferred stock which will enable the Canadian Connecticut Cotton Mills, Limited, to erect an addition to its plant at Sherbrooke, Que., increasing its capacity by about 100 per cent. The new addition will contain 400,000 sq. ft. of floor space and will be built of brick and steel with modern lighting, heating and plumbing. The new mill will be devoted to the manufacture of automobile tire fabrics, furnishing employment for about 900 operators.

## Stoughton Wagon Forms Timber Supply Branch

STOUGHTON, WIS., March 1—The Stoughton Wagon Co., of Stoughton, Wis., which in recent months had developed and is now manufacturing a motor truck trademarked the "Stoughton," has organized a subsidiary corporation, known as the Ozark-Badger Co., capital stock, \$15,000, to facilitate the securing of an assured timber and lumber supply for the works at Stoughton.

Two sawmills, with a capacity of four to five carloads daily, at Wilmar, Ark., have been purchased by the new Wisconsin corporation, and will provide steady supplies of oak, hickory, pine and red gum, most of which will be shipped from Arkansas to Wisconsin. F. J. Veal, president of the Stoughton Wagon Co., is head of the new concern. J. F. Knowles, of Wilmar, is vice-president, in charge of the sawmill operation in Arkansas.

## WESTINGHOUSE ENLARGES

MILWAUKEE, March 1—The Milwaukee works of the Westinghouse Lamp Co. at 3100 Center Street are being enlarged at a cost of \$400,000 to provide about 100,000 sq. ft. of much-needed floor space. Two 2-story fireproof factory additions, 80 x 250 and 80 x 200 ft., will be erected and will be ready for occupancy about July 1. At that time the present force of 560 employees will be increased to approximately 1000. Harry M. Robbins is general manager.

## STEARNS FOUNDRY OPENS

LUDINGTON, MICH., Feb. 28—The new foundry building erected by the Stearns Motor Manufacturing Co. now is in operation doubling the plant output. The factory now employs 200 men, and plans several more additions, and a largely increased payroll during the coming summer. It manufactures tractors and farm light plants.

## TO DOUBLE GASKET OUTPUT

DETROIT, Feb. 28—Springman Paper Products Co. has purchased the plant of Schwanbeck Bros., comprising approximately 500 sq. ft. of floor space, doubling facilities for production. The Springman company began business 14 years ago in a barn, catering to the lithographing and printing trades. It was one of the first to enter the paper gasket business as the automobile industry developed in Detroit, and at present is one of the largest firms in this line in the country, doing a business of approximately one-half million dollars a year. The company also manufactures a high grade gasket packing. Officers of the company are: Charles T. Springman, president; Lloyd H. Diehl, vice-president; Russell Springman, secretary; O. E. Werner, treasurer.

## ROWE TO INCREASE OUTPUT

LANCASTER, PA., Feb. 28—The Rowe Co., manufacturer of automobile trucks, is planning to increase the output from ten to twenty trucks a day.

## Delion Tire Taken by Baltimore Interests

TRENTON, N. J., Mar. 1—The Delion Tire and Rubber Co., of Trenton, N. J., has sold its entire business, name, goodwill, trade-marks and certain other properties to Walter C. Price and associates, of Baltimore, Md., who have reorganized the company, obtaining a charter under the laws of the State of Maryland, with the same name, with an authorized capital of \$1,500,000. Price was formerly president of the Price Hardware Co., wholesale merchants at Pulaski, Va.

The company will erect a modern, up-to-date factory in Baltimore, with an initial capacity of 400 tires per 24-hour day, and will manufacture the highest quality of fabric and cord tires and tubes.

The Delion Tire and Rubber Co. had been conducting a tire manufacturing business since 1915 at Trenton.

## Manufacturers Join in Civic Pride Show

CLEVELAND, Feb. 28—Automobile manufacturers of Cleveland lent themselves to a new advertising feature, when they combined in a civic pride automobile show, staged by the May Co., a leading Cleveland department store, in a display of made-in-Cleveland-only automobiles. The show was held on the third floor of the department store, the following manufacturers being represented: Winton, Ferris, Peerless, Jordan, Chandler, Cleveland, Stearns and Grant.

## TAKES UNION STEEL AGENCY

DETROIT, Feb. 28—Don F. Kennedy, metallurgist and manufacturers' agent, of 1257 David Whitney Building, has taken the agency for Michigan of the Union Electric Steel Co. of Pittsburgh, manufacturers of tool and alloy steels. This company at present is producing ingots and billets and is installing a conversion plant which will soon place it in a position to produce finished bars, die blocks and steam hammer forgings. Kennedy is also handling the towmotor in Michigan and Toledo.

## OPENS CHICAGO OFFICE

CHICAGO, Feb. 28—Permanent offices and salesrooms have been opened in Chicago by the Black & Decker Mfg. Co., manufacturers of service shop equipment and automobile machinery. The new office is in charge of R. O. Ames, whose territory has been extended to cover the entire Middle West.

## TO CHOOSE AVIATORS

PHILADELPHIA, Feb. 28—Joseph A. Steinmetz, president of the Aero Club of Pennsylvania, has received notice from the Aero Club of America that his club will be allowed to choose the aviators who shall represent Pennsylvania in trials for the selection of pilots to compete in international air contests which are to be held this year in the United States, France, Italy and Monaco.

## Men of the Industry

### Changes in Personnel and Position

H. M. Jackson has been promoted to the post of factory manager of the Hess-Bright Manufacturing Co. E. N. Bernhard, who served for a considerable period as planning manager of the company, has been made assistant to the general factory manager.

F. L. Waite, for seven years advertising manager of the Reo Motor Car Co., has resigned, effective March 1. His plans for the future have not been made public.

Roscoe Robinson has resigned from the production department of General Motors Truck Co. in Pontiac, and will join the organization of the Bethlehem Motors Corp. in Pennsylvania.

George H. Finn, vice-president of the McJunkin Advertising Co., Chicago, has been elected to the directorship of the Baker Tractor Corp. He will be in direct charge of merchandising.

E. H. Hiatt, for five years factory manager and engineer of the Saginaw Sheet Metal Works, manufacturers of automotive sheet metal parts, has resigned.

R. J. Parvin is handling the business of the William R. Johnston Manufacturing Co. of Chicago, manufacturer of plate glass auto curtain windows. Parvin was for five years salesmanager of the Ponberthy Injector Co.

P. J. Dasey has tendered his resignation as salesmanager of the Blodgett Engineering & Tool Co., and will rejoin Lon Smith, of the Midwest Engine Co., Indianapolis. Dasey will be engaged in research and sales engineering work. He served with Smith as sales engineer of the Buda Co.

F. Van Z. Lane, who resigned as chief engineer for the Packard Motor Car Co., has been succeeded by T. Harris Smith, transportation engineer of the Packard New York Co.

## S. G. V. IS REORGANIZED

NEW YORK, Feb. 28—Announcement is made of plans for the reorganization of the S. G. V. Motor Car Co., and for the resumed production of S. G. V. cars at an early date.

Lovett A. Grant, who was general manager in charge of production at the S. G. V. factory in Newark, and for the past four years has been engaged in the manufacture and distribution of S. G. V. parts, is to head the new company.

Grant announces that plans of the company provide for the continued manufacture of cars on a quality basis. Distribution will be made at the start only in the larger cities of the country.

Temporary offices of the new S. G. V. company have been established at 250 West Fifty-fourth Street, New York City.

## New Heads Named of Chamber Departments

WASHINGTON, Feb. 28—Chauncey D. Snow, former commercial attache at Paris, has been appointed head of the Department of Foreign Trade by the Chamber of Commerce of the United States.

Organization of an insurance department is announced by the Chamber of Commerce of the United States, with M. B. Trezevant as its manager. The insurance department is one of six or seven new departments which the Chamber is organizing to afford specialized facilities for dealing with subjects in important fields of American business. The new department will, on the one hand, familiarize itself with the peculiar problems of all kinds of American insurance, and on the other hand, will seek data from the point of view of business men who are users of insurance.

## National Truck Tour Entries Close May 1

OMAHA, Feb. 28—Entry for the First National Motor Truck Reliability Contest, to be run out of Omaha, starting on or about May 31, will close in Omaha on May 1. The trucks for the contest will have to be in the hands of the technical committee at Omaha by May 21. Charles P. Root, general manager of the tour, has made an inspection of part of the route recently. He found many of the proposed roads being traveled and decided upon some changes in the routings to make possible night and noon stops at larger cities.

## "Y" TRAIL OFFICERS CHOSEN

MILWAUKEE, March 1—H. B. Whiley of Miles City, Mont., was re-elected president of the Yellowstone Trail Association at the annual meeting of the executive committee, held in Milwaukee for the first time. John N. Willys of Toledo was elected vice-president of the Eastern division; Ray Smith of Milwaukee, vice-president of the middle division, and Dan Bass of Seattle, Wash., vice-president of the Western division. The entire "Y" trail will re-marked this spring.

## EMERSON OFFICIALS CHANGE

ROCKFORD, ILL., Feb. 28—O. M. Peters, until recently general superintendent of the Emerson-Brantingham Co., has resigned to become general manager of Clark Brothers Co., New York. W. L. Clark has been appointed domestic salesmanager for the Emerson-Brantingham Co., with Frank M. White as his assistant.

## VORHIS NAMED MANAGER

CHICAGO, Feb. 28—H. S. Vorhis has been appointed general manager of the Mid-West Rubber Manufacturers' Association, with headquarters in the McCormick Building, Chicago. Vorhis is well known in the rubber trade through his former connection with the Rubber Association of America.



# Calendar

## SHOWS

- March 6-13—New York, N. Y. Second Annual Aeronautical Exposition, Manufacturers' Aircraft Assn., Inc., 71st Regiment Armory. Walter Hempel, Manager.
- Mar. 6-13—Greenville, S. C. Carolina Automobile Show. Greenville Dealers' Assn. Textile Hall.
- Mar. 7-13—Muskegon, Mich. Automobile Show. Muskegon Auto Business Men's Assn. J. C. Fowler, Manager.
- Mar. 8-13—Indianapolis, Ind. Annual Automobile Show. Indianapolis Auto Trade Assn. Manufacturers' Bldg. State Fair Grounds. John B. Orman, Manager.
- Mar. 10-13—Lebanon, Pa. Annual Motor Show. Automotive Trade Association of Lebanon. James Furniture Store-Bldg. J. Paul Enck, Manager.
- Mar. 12-20—Boston, Mass. Annual Automobile Show. Mechanics' Building.
- Mar. 15-20—Great Falls, Mont. Automobile Show. Montana Automobile Distributors' Association.
- Mar. 20-27—Trenton, N. J. Annual Automobile Show. Armory. Trenton Automobile Dealers' Assn. John L. Brock, Manager.
- Mar. 20-27—Pittsburgh, Motor Square Garden. Automotive Association, Inc. John J. Bell, Manager.
- Mar. 22-27—Duluth, Minn. Automobile Show. Duluth Auto Trades Assn. W. F. Daly, Director.
- Mar. 22-27—Utica, N. Y. Annual Automobile Show. Utica Motor Dealers' Association.
- Mar. 22-27—Oklahoma City, Okla. Annual Automobile Show. Oklahoma City Motor Car Dealers' Assn. G. W. Woods, Manager.

- April 21-28—San Francisco. National Aeronautic Exposition. Exposition Auditorium.
- Oct. 6-16—New York. Electrical Show. Grand Central Palace. George F. Parker, Manager.

July—London, England. International Aircraft Exhibition. Olympia. The Society of British Aircraft Constructors.

## CONTESTS

- August, 1920—Paris, France. Grand Prix Race. Sporting Commission Automobile Club of France.
- June, 1920—Omaha, Neb. Reliability Truck Tour.

## FOREIGN SHOWS

- March—London, England. Motor Boat Marine and Stationary Engine Exhibition.
- March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.
- March 1-15—Lyons, France. Automotive Products, Lyons Industrial Fair.
- April or May—London, England. Commercial Vehicle Exhibition. Olympia.
- April 3-May 4—Buenos Aires. Exposition of U. S. manufacturers.

## CONVENTIONS

- May 9-12—Independent American Petroleum Congress, Congress Hotel, Chicago.
- May 13-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

## S. A. E. MEETINGS

- Mar. 10—Aeronautic Dinner and Meeting. S. A. E. Headquarters, New York.

## Manufacturers Act to Aid Patent Office

WASHINGTON, Feb. 28.—Manufacturers from various sections of the country testified before the House Rules Committee this week on the Nolan bill, providing a 10 per cent increase in the force of the Patent Office and a 20 to 25 per cent increase for Patent Office employees. One delegation representing the National Association of Manufacturers was headed by Milton Tibbetts, patent counsel of the Packard Motor Car Co. This delegation comprised twenty-one representatives of manufacturers.

The Patent Office has been threatened with collapse because the wages of the patent commissioners and other employees have not been increased for several decades and the workers are unable to meet the present cost of living and retain their positions.

"The employees of the Patent Office have been resigning steadily," Tibbetts told members of the House. "An increase of pay is the only thing that will keep the organization from being thoroughly wrecked."

"If that is allowed to happen," said Tibbetts, speaking for the National Association of Manufacturers, "the losses, confusion and delay will be enormous. Moreover, they will continue for years, because the work of the office depends upon long training and exact knowledge."

"The delay in giving the men salaries large enough to cover their living expenses will be one of the worst economies imaginable."

"The loyalty of the Patent Office employees has been splendid, but they can't be expected to remain on salaries that are too small to support their families."

"This life-saving bill has been recommended for passage by the Patent Committee of the House and is now up for

consideration by the Rules Committee. The manufacturers of the country will persist in using their strongest efforts to have this bill passed as demanded by the industrial life of the country."

## Propose City Garage as Parking Remedy

NEW ORLEANS, Feb. 28.—Because of the fact that the parking of cars in cities is so closely connected with sales possibilities, car manufacturers may be interested in an experiment that has been proposed here. It is not yet assured that the plan will be tested, but it is outlined as follows:

Joseph A. Blythe, a real estate man, has proposed to the City Commissioners that the city purchase seven blocks of poorly improved property near the center of the city, and build thereon parking garages, in which cars could be stored for short intervals at a nominal cost. Blythe has represented that this method of handling the situation would be of benefit to all car owners, would do much to check thefts and would abate to a large extent the parking alongside the streets in the shopping and office building district, which has become a nuisance.

## BUYS HOPEWELL (VA.) SITE

WILMINGTON, DEL., Feb. 28.—The Mayhew Steel Products, Inc., of 291 Broadway, New York, according to an announcement made by the du Pont Chemical Co., has taken a 10-acre site at Hopewell, Va., on which it will erect a new plant. The company, which now has a plant at Shelburn Falls, Mass., manufactures automobile tool kits and mechanics' hand tools. The Hopewell plant will be used exclusively in the manufacture of pliers and wrenches. It is expected to have the establishment in operation by July 1.

## Army to Build Plane Base on Staten Island

NEW YORK, Feb. 28.—New Dorp, Staten Island, is to be the site of an aerial coast defense station being built for the Army Air Service as a base for land and sea planes patrol aircraft to guard the Atlantic shores. The new station covers approximately 413 acres, with a frontage on the ocean of 1750 ft., and is located on the old Vanderbilt estate. Work on the hangars and piers is now under way.

The new station has been named Miller Field, in honor of Capt. J. T. Miller, who was killed in action in Corpeny, France, March 8, 1918. The field will be complete in every particular. A wireless transmitting station and a separate wireless receiving station will be erected. The landing ground is in the center of the quadrangle formed by the buildings and ocean. The beach will be equipped with a marine railroad for hoisting sea-going aircraft ashore.

## EX-AVIATORS FORM COMPANY

AKRON, OHIO, Feb. 27.—The National Airway Service Co. of Akron, with a capital of \$80,000 has been incorporated here by Lieut. L. F. Ross. J. G. Layton, R. C. Norris, E. Loquist and Lee Myers, ex-army pilots, all of whom were in active service overseas.

With the purchase of new machines plans for commercial aviation will be perfected. Business will be established in every phase, including passenger cars, aerial photography and a school of instruction in flying. An aerodrome will be maintained here as a base for the operation of pilots and for the use of visiting machines.

Negotiations have been concluded for representation here of the Inter-Allied Aircraft Co. of New York.